DOCUMENT RESUME

ED 220 295	SE 038 820
TITLE	Environmental Studies. Plano Outdoor Learning Center.
INSTITUTION	Plano Independent School District, Tex.
PUB DATE	Aug 77
NOTE	556p.
EDRS PRICE	MF02/PC23 Plus Postage.
DESCRIPTORS	Animals; Curriculum Guides; Elementary School Science; Elementary Secondary Education; *Environmental Education; Ichthyology; *Nature Centers; Ornithology; *Outdoor Activities; Outdoor Education; Pollution; *Science Activities; *Science Teaching Centers; Secondary School Science; Teaching Guides; *Trails; Units of Study

ABSTRACT

This curriculum guide for the Plano Intermediate School District (Texas) Outdoor Learning Center is divided into three major sections. Section I provides information on the numbered stations/posts found along the perimeter and inner trails of the center and includes brief comments on the philosophy of environmental education and the history (geology, land use) and use of the trails (trail construction, signs, general rules). Section II is designed to provide background information for teachers using the center and includes a sample permission form; guidelines for student preparation (permission form importance, safety, conservation/preservation, general rules); emergency procedures; list of common/scientific names, locations, and characteristics of plants found at the center; common/scientific names, habitats, and other information on animals found at the center; and geological information. Section III provides a list of seven goals for K-12 environmental education and an extensive number of science unit plans. Each unit plan includes title; key concepts; content area; grade level; objectives; classroom, campus, site, and/or supplementary activities with related instructional strategies; and instructional resources. A bibliography, feedback form, and list of features found seasonally or at varied locations on the trails are also provided. (JN)

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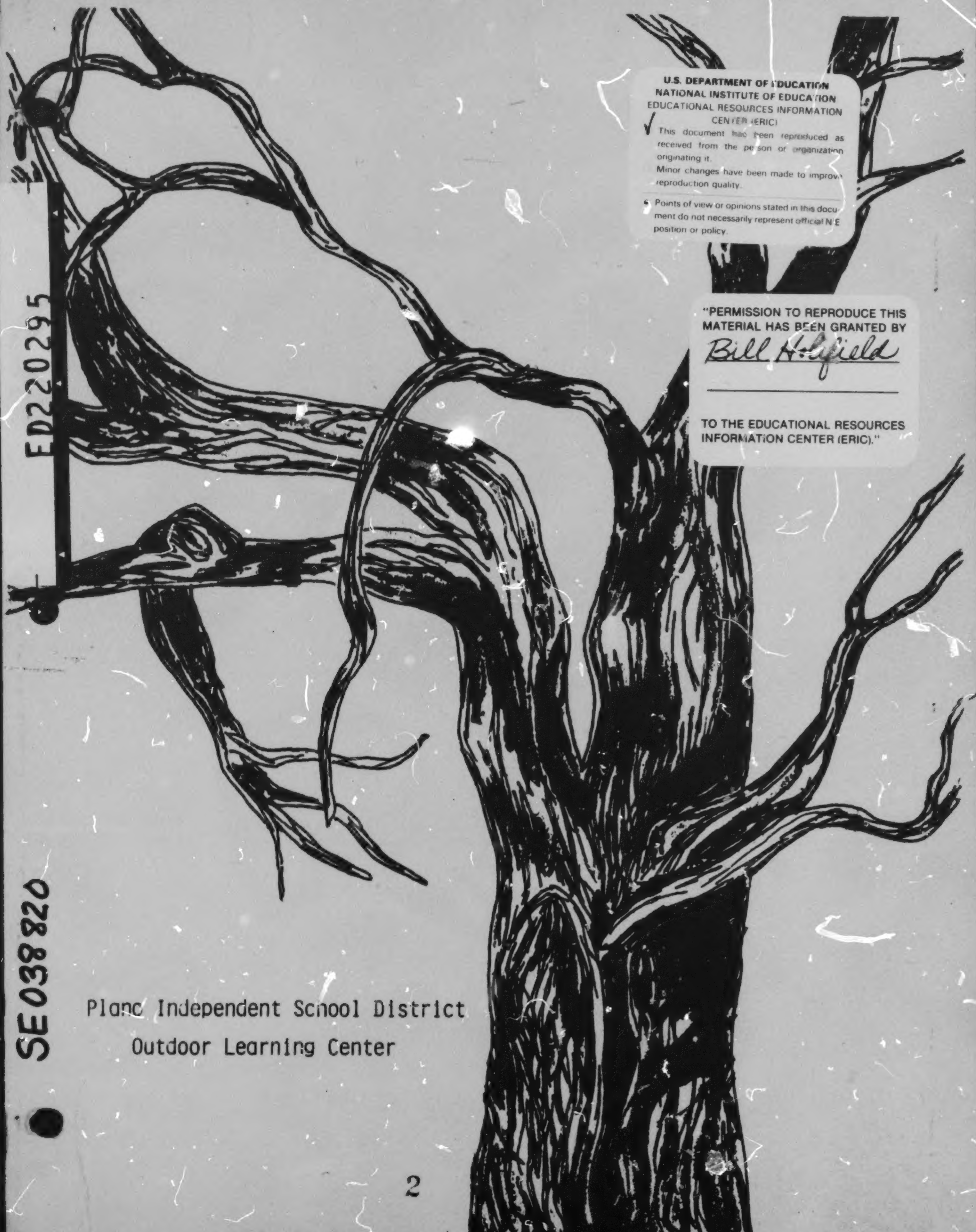

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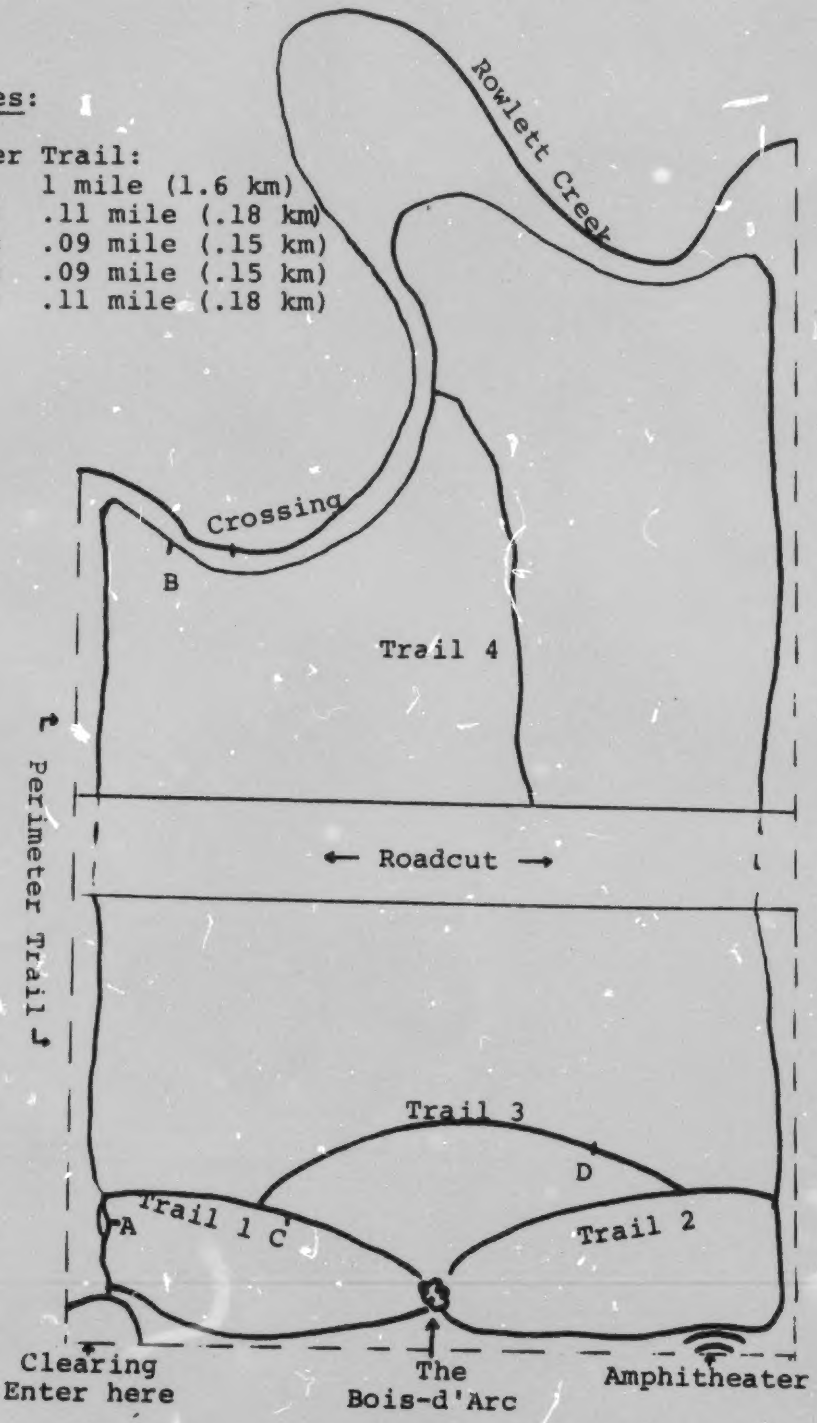
Plano Independent School District
Outdoor Learning Center

Map of Plano I.S.D. Outdoor Learning Center


Rowlett Creek
Crossing
B
Trail 4
Perimeter Trail
← Roadcut →
Trail 3
D
Trail 1
C
A
Trail 2
Clearing
Enter here
The
Bois-d'Arc
Amphitheater

Distances:

Perimeter Trail:
1 mile (1.6 km)
Trail 1: .11 mile (.18 km)
Trail 2: .09 mile (.15 km)
Trail 3: .09 mile (.15 km)
Trail 4: .11 mile (.18 km)

Stations:

A: Rotting Log
B: Rowlett Creek
C: Photographic Site
D: Bee Tree

Cover: The Bois-d'Arc, symbolic in its strength and longevity, is a prominent point where Trail 1, Trail 2, and the Perimeter Trail meet.
Cover Artist: Shirley Holmes of Plano I.S.D.

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ENVIRONMENTAL STUDIES

Plano Independent School District
Plano, Texas

August, 1977

TABLE OF CONTENTS

Page
Foreword i

Outline to Section I 1

Philosophy of Environmental Education . 2

Introduction - The History 3

Explanation of Use 5

Perimeter Trail (#1-56) 7

Inner Trails

Trail 1 (#57-63) 24
Trail 2 (#64-66) 27
Trail 3 (#67-73) 29
Trail 4. 32

Bibliography 33

Outline to Section II 34

Permission Form 36

Student Preparation 38

Emergency Procedure 40

Supplemental Material for Teachers . . . 46

Bibliography 77

Outline to Section III 78

FOREWORD

Many different individuals and committees have contributed to the development of the Plano Independent School District Outdoor Learning Center and to this curriculum guide. The general advisory committee gave overall guidance to the program by studying environmental education trends, meeting with consultants, and developing the scope and sequence of the program. This committee was made up of the following people:

Jeannie Bowman	Weatherford Elementary School
Norma Hill	Barron and Mendenhall Elementary Schools
Barbara Hirsch	Plano Senior High School
Mary Johnson	Barron Elementary School
Gene Scott	Armstrong Middle School
Pat Tuck	Bowman Middle School

Many individuals also served as a curriculum writing team. These teachers have made a valuable contribution by involving themselves in several hours of inservice training, as well as the actual writing of the guide. These individuals are as follows:

- Kindergarten:
  - Susan Bennett
  - Vera Semff
- First Grade:
  - Norma Hill
  - Pat Sessions
  - Marty Middendorf
- Second Grade:
  - Burt Combs
  - Ellen Levy
- Third Grade:
  - Don Allen
  - Mike Conroy
  - Betsy Savage
- Fourth Grade:
  - Andi Williams
  - Nathan Lee
- Fifth Grade:
  - Jeannie Bowman
  - Mary Johnson
  - Phil Saviano
- Sixth Grade:
  - Marty Brown
  - Nancy Kirby
- Life Science:
  - Betty Wetsel
  - Jack Worsham
- Earth Science:
  - Gene Scott
  - Pat Tuck
- Environmental Studies:
  - Gene Scott
  - Pat Tuck
  - Betty Wetsel
  - Jack Worsham
- Art Consultants:
  - Patti Adams
  - Shirley Holmes
- Curriculum Coordinators:
  - Luanne Collins
  - Pam Hamilton
  - Ernest Horany

Much of the success of this project is due to the following consultants who were so helpful in various phases of the project:

Mrs. Claude Albritton - shared the history of the site with us.

Mr. Tom Barra --------- Consultant, Texas Water Quality Board, Austin, Texas

Mr. Riley Churchill --- Consultant, Soil Conservation Service

Dr. Harold Laughlin --- Director of Heard Museum, McKinney, Texas

Dr. Ray Quinn --------- Professor of Wildlife and Fisheries, Texas A&M

Mr. Larry Schaapveld -- Forester, Texas Forest Service

Mr. Ed Schwille ------- Consultant, Soil Conservation Service

Mr. John Whittle ------ Consultant, Texas Water Quality Board, Austin, Texas

Mr. Dan Wilkerson ----- Environmental Consultant, Environmental Research Associates, Bryan, Texas

Special thanks are due the following people who made valuable contributions by freely giving much time and energy to the project:

Mr. Walter Cooper ----- Texas Power and Light Company (donated poles for the amphitheater and bark for trail covering)

Boy Scout Troop 291 --- Many of the boys in this troop donated several hours of work on the site
David Allen
Mark Allen
Ken Dykes
Kevin Gardner
Steve McIlrath
Ronny Powell

Mr. Bob Woodruff and
Mr. Rod Hogan -------- City of Plano, Parks Department (helped coordinate this project with the Park Board of the City of Plano)

A function crucial to the overall development of the site, curriculum guide, and inservice program has been the coordination of the various groups and individuals involved. For this effort, appreciation is due Gene Scott, who served as site development coordinator; Luanne Collins, coordinator of elementary curriculum; Pam Hamilton, for coordinating the overall efforts of all groups during the summer; Norma Hill, for assisting in writing the trail guide; and Mike Owens, Education Service Center, Region X consultant, who was so valuable in the staff development effort.

Special appreciation is due Ernest Horany, Secondary Curriculum Coordinator, who took a leadership role from the beginning and did an outstanding job in all aspects of the project.

Billy M. Holifield
Assistant Superintendent
for Curriculum

OUTLINE TO SECTION I

- I. Trail Guide
  - A. Philosophy
  - B. History
    - 1. Geology
    - 2. Land use
  - C. Explanation of Use
    - 1. Trail construction
    - 2. Signs
    - 3. General rules
  - D. Perimeter Trail (#1-56)
  - E. Inner Trails
    - 1. Trail 1 (#57-63)
    - 2. Trail 2 (#64-66)
    - 3. Trail 3 (#67-73)
    - 4. Trail 4
  - F. Bibliography

A. PHILOSOPHY OF ENVIRONMENTAL EDUCATION

The Plano Independent School District believes that environmental education should be integrated into the total school curriculum, grades K-12. Environmental education should develop in a student an appreciation for, and a recognition of, his interdependence with the bio-physical and socio-cultural environment. This recognition should result in the student's commitment and dedication toward maintaining the environment.

At the elementary level environmental education should concentrate on an awareness of the interrelationships between the child and his world. At the middle school level the focus should be on an understanding of the environmental processes, and at the high school level attention should center on evaluation of possible solutions to environmental problems.

The district believes that programs and activities designed to implement environmental education can be used to reinforce the basic skills and concepts which are an integral part of the student's education.

B. INTRODUCTION - THE HISTORY

Prehistoric fish, trappers, Indians, pioneers, farmers,... students... Throughout history this piece of land, now the Plano ISD Outdoor Learning Center, has had numerous visitors and inhabitants. The length of time they stayed varied. Once warm seas covered the entire area now called Collin County. Remnants of the ancient life once found in these seas can be found today as fossils in many of the white rock creeks around Plano. Just as the deposits buried these creatures over time, the eroding forces of wind, rain, and flowing water have uncovered them with time.

Millions of years have past since the sea covered the area. The underlying limestone deposited during the Cretaceous period mixed with a variety of rotting organic material to form the famous fertile Blackland Prairie soils of the region. As time passed, this soil played host to both prairies and forests. Attracted to the prairies were deer, some buffalo, many prairie chickens and quail. Housed by the forests were panthers, bears, wolves, as well as varieties of small game. The streams cutting this soil were also rich with wildlife.

Just as the land attracted wildlife, it helped bring man. The Indians and trappers knew of the abundance of game. In fact, one trapper, Daniel Rowlett, found the area particularly lush as he trapped in the area; our creek bears his name. Little impact was felt on the land by the men drawn by game compared to the impact on the area of men drawn by another force: free land.

The settlers came in droves. Many came to the Peters Colony; many left. One passage from the north was well travelled by pioneers in their covered wagons. Today, a few signs of [illegible] remain along the west side of Rowlett Creek.

Years came and passed. Much of the land in Collin County has been farmed for years with cotton, sorghum, and wheat. Just as the land changed from a giant sea to forest and prairie to farms, it is again changing. Once quite slowly, now rapidly, the land is changing from basically agricultural to predominantly urban and business.

The Plano ISD Outdoor Learning Center is no exception to this change. Part of the area has been farmed by the Albritton family; part was left as mature hardwood forest and a stream. Adjacent to the site, homes are being built.

Changes have also occurred within the site. Just over a year ago the land was turned over to Plano ISD for development of an outdoor learning center. Both Plano ISD and the Plano Parks and Recreation Department will be using the land in outdoor programs. Yet, like the trapper, Rowlett, the changes being made by the new inhabitants are subtle and calculated not to have a large impact on the environment.

C. EXPLANATION OF USE

Just as the forest didn't appear overnight, neither did the outdoor learning center. Talk about the possibility of having a center started in the fall of 1975. In the next two years a tremendous amount of work was done. A federal grant was applied for and received. Representatives from the school district and park department met and discussed the possibility of the center. Plano Parks and Recreation Department gave permission for P.I.S.D. to develop and use the land. An advisory committee worked on a plan and ideas for the site. Several professional surveys were conducted at the site ranging from mapping possible trails to identifying woody plants.

As information was collected and analyzed, trail construction began. The trail was hand cut with a special brush cutting mower. Ten foot lengths were cut so that the trail would touch as many points as possible. To line the trail, wood was pulled from the trail. Care was taken to make the trail, using methods to keep the environment stable and to change it as little as possible. Consistent with this philosophy, the trails were not concreted, but covered with bark chips, which were deposited one wheelbarrow at a time.

Completing the trails required construction of markers, stations, and rope enclosed exhibits. Wooden posts were numbered and placed unobtrusively at the base of trees or phenomena to be noted in the trail guide. Several stations consisting of wooden posts and tops were constructed at certain points. Especially fragile or potentially dangerous areas were roped off. Care was taken to use as much natural, on-site material as possible in the construction.

The great care taken in planning the P.I.S.D. Outdoor Learning Center is just a start. Great care must also be taken to maintain it. To protect and preserve the natural environment, we must be conscious of the possible effects of our activities. One cigarette or campfire could wipe out hundreds of years of nature's work. Trees, plants, animals...people could be killed.

Less dramatic, but still quite destructive, littering can alter the environment. Hundreds of environmentally aware people could travel these trails each day with little effect. If paper and food are dropped, trees carved, logs lining the trails moved by even a few people, the environmental quality found at the center will be impaired.

D. PERIMETER TRAIL

Clearing: Once into this area, you have left the grassland which was once cleared and farmed. You are now in a mature, hardwood forest. The forest has its own sounds, climate, communities; we are the visitors. Please respect the plants and animals living here. The poison ivy has been cleared from the trails, but is common once off the path. There have been poisonous snakes seen both in the forest and the water. Have a healthy respect for them; keep your distance and you'll be fine.

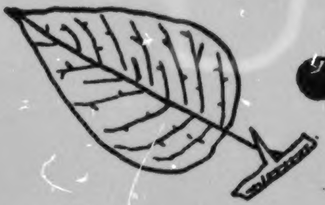
Observe your surroundings. Where did the bark chips come from? Is this recycling? Why are the trails done this way? Why aren't the trails straight lines?

Notice the information stand. How is it constructed to blend with the natural environment? The stand will contain information about the trails.

Look at the cross sections of the logs. How do you figure the age? How old are they?

Note the post by the first tree. As you may guess the #1 on the post corresponds to the #1 in the guidebook. Why do you think the tree was labeled this way?

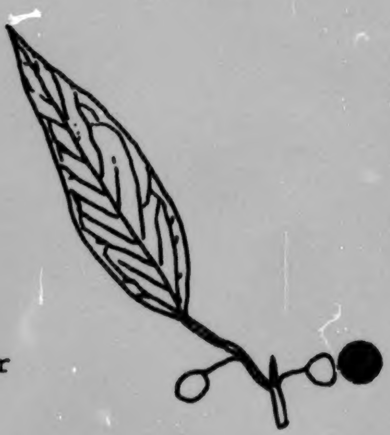
You are at the starting point for the perimeter trail. Before you start, familiarize yourself with the map of the trails. Decide how far you wish to go. There are almost 2 miles of trails at P.I.S.D. Outdoor Learning Center. The perimeter trail is just over one mile.

#1

Common name: Osage Orange (16.3 D.B.H.)
Scientific name: *Maclura pomifera*
Other names: Bois-d'Arc, Horse Apple
Found: native to eastern and central Texas
Identification:
Size: height 20' to 40', diameter 4" to 12"
Bark: thin, gray, may have yellow, older tree in strips, flakes
Twigs: thorns 3/8" to 1" long
Leaves: simple, alternate, oval-pointed and entire, 3" to 5" long, 2" to 3" wide, rich green on the upper surface and turn yellow in autumn
Flowers: in May, yellow, female forms around ball on same tree
Fruit: rough, green orange, 2" to 5" diameter
Wood: hard, strong, durable, bright orange in center, turns brown after being exposed.
Additional information:

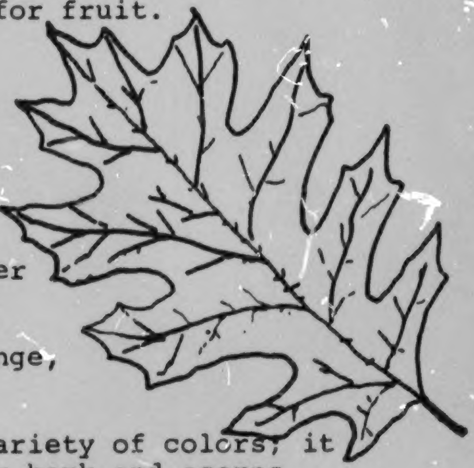
The name "Bois-d'Arc" comes from the French language and means "wood of the bow". This strong wood was used by the Indians for bows and clubs. The settlers used it for strong fence posts; some set 200 years ago are still used today.

The number after the name in the guidebook is the D.B.H. For example, this first tree, Osage Orange, has a D.B.H. of 16.3". The D.B.H. simply is the diameter at breast height of a six foot man. If no six foot tall man is available, measure up 4½', then take the diameter. You may measure around in inches and then figure the diameter using $D = \frac{C}{\pi}$ or use a special tape.

As you go down the trail and further into the forest, notice the temperature difference. What do you smell? hear? Where will you find more animals...the forest or the plains? Is this a virgin forest? Has it been used? clear cut?

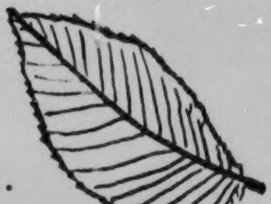
#2

Common name: Sugar Hackberry (15.6)
Scientific name: *Celtis laevigata*
Other name: Sugarberry
Identification:
Leaves: simple, alternate, long-pointed, smooth margined leaves, pointed 2" to 5" long bases mostly uneven
Bark: warty, gray to brown
Flowers: greenish
Berry: dark purple, spherical, 1/3" diameter
Size: 50' high

Additional information:
Wood has been used commercially. Many birds eat fruit. It is said the Indians ground up dry fruit and pits for fruit.



#3
Common name: Shumard Oak (25.5)
Scientific name: *Quercus shumardii*
Other name: Shumard Red Oak
Found: common to east Texas
Identification:
Size: 70' to 100' height, 2'-5' diameter
Leaves: deeply lobed, hairless, thin and dull above, end buds 3/16"-5/16", not angled, turn red, orange, even brown in fall, deciduous
Additional information:
The bark has been used in tanning for a variety of colors; it even has been used on wool and silk. The inner bark and acorns have been cut, dried, and powdered and used as an infusion, a gargle, and a healing salve. It has also been used for dysentery and diarrhea.

Look at the stain on the side of the tree. How does it effect the tree? What caused it? Why is it called a red oak?



#4
("The crooked tree" is about 20 m. south of the trail. How did it get this way?)
Common name: American Elm
Scientific name: *Ulmus americana*
Found: mostly bottomlands, many are in Texas.
Identification:
Size: 80'-100' height, diameter 2'-5' (largest of elm)
Leaf: simple, alternate, 4" to 6" long and 2" to 3" wide, vase-shaped, doubly toothed margins, veins show up well, dark green top is smooth
Bark: dark gray, flat-topped ridges
Buds: over ¼" red-brown scales with dark edges
Flowers: March-May
Fruits:, about 3/8" broad, hairless, except margins (This is the way you tell if it is an American or Slippery Elm.)
Additional information:
The wood is widely used from flooring to sporting goods. Indians used the wood for canoes. Many birds and animals eat parts of the trees. Settlers made good use of the tree from cooking to medicine.
Today the tree is often planted for its graceful spreading leaf.

What are the strings and stakes used for in front of the tree?

(Transect lines in developing the site.)

#5
Animal hole

What kind do you think it is? Is it still used? Why do you think this? (old, armadillo)

#6
Another Osage Orange or Bois-d'Arc (12.1)

This tree grows well anywhere in Texas where it is planted. The young plants are covered with sharp thorns. During the late 1880's it was planted all over the state as people attempted to make Texas a "land of hedges". Today many hedges, now scraggly trees, remain.

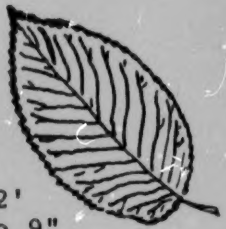
Notice the livestock in the field. What kind are they? What do they produce?

LOOP A

On this loop you will see 3 pecans, Virginia creeper, and a hackberry. How does the young hackberry differ from the old? Notice how the elm was cut down and still continues to grow.

A STATEMENT TO THINK ABOUT: "A tree is like an apartment house. many different families live around and inside it on different levels."

#7



Common name: Red elm (22.8)
Scientific name: *Ulmus rubra muhl*
Other name: Slippery elm
Found: fertile soils
Identification:
Size: 40' to 60' height, diameter - 1'-2'
Leaves: rough above and hairy below, 5" to 9"
Twigs: rough, hairy
Buds: red, hairy, over 1/8"
Additional information:

Slippery elm received name from the thick mucilaginous bark. Once used to treat fevers, colds, and bronchial affections, and to prevent scurvy. It was simply chewed or ground into flour. Animals share in the eating of this tree. You could see rabbits and even deer eating the smaller branches. Indian squaws used it to help ease childbirth pains.

(There is a colony of ants on the slippery elm that are not marked.)

There are also more pecans on this loop. What is occurring at the base of the pecan at the start of the loop? (rotting)

STATION A
Rotting log

A good place to experiment with composers. What type of communities live here? Is it useful?

You just entered an opening. What changes do you see? What caused them? (maybe lightning) Compare plant growth with plants to left. How does the amount of light affect growth? What is the temperature like?

At this point, you may continue on the perimeter trail or take trail #1. The guide for trail #1 begins with #57.

How old do you think the oak at the trail crossing is?

A STATEMENT TO THINK ABOUT: "In nature, death gives life."

#8
Dead elm with shelf fungi and wood borers

What animals or communities could live or evolve here? Also, notice the woodpecker holes.

#9
Receding water left debris

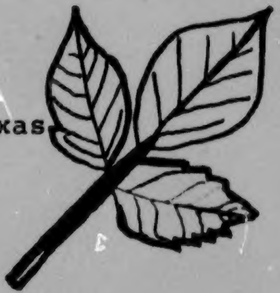
Notice the number of large trees and amount of material moved by the water. It's a good place to take soil temperature as it decomposes. It's also a good place to watch for copperheads. Another danger here would be the poison ivy on the tree.

At this point, once again notice the difference in plant growth due to differences in light.

#10

At this point, both poison ivy (large) and Virginia creeper (small) are growing. Take advantage of seeing them side by side to learn the difference. Poison ivy has a dangerous skin irritant. Being able to recognize and avoid it could save alot of discomfort later.

Common name:	Poison Ivy
Scientific name:	*Rhus toxicodendron*
Found:	woods and thickets, including Texas



Identification:

Leaflets: 3 parted, compound, usually ovate, long-stalked, vary greatly in shape and size, leaf margins may be smooth, deeply pointed or slightly lobed, tip is pointed, base is either slightly pointed or deeply lobed

Twigs: are brown and, if climbing, have many short aerial rootlets; old stems are densely covered in dark fibers and up to 6" in diameter

Flowers: small, yellowish

Fruit: small, smooth, ball-shaped,white

Additional information:

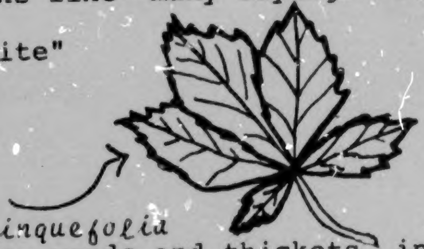
All parts of this plant, including the roots, contain a poisonous oil, which may cause blisters, eruptions, burning and itching. Seventy percent of all people will react allergic to it. Those "immune" to it can lose their immunity at any time. Reactions can be caused by direct contact with the plant, from smoke of burning poison ivy, or even by touching shoes or clothing that have touched the plant.

If you accidentally touch poison ivy, wash well with soap and water. Severe cases may need to see a physician. Though the discomfort may be quite intense, sources consulted say no one has died from it.

The best medicine seems to be leave the plant to the birds. Over 60 species of birds eat the berries. In fact, they are a main cause of the spread of seeds. They eat the fruit and pass the seed undamaged.

To remember what this plant looks like--many sayings have evolved over the years, such as:

"leaves of three and berries white"
"leaflets three, let it be"



#10 (continued)

Common name: Virginia Creeper
Scientific name: *Parthenocissus quinquefolia*
Found: many places on site; woods and thickets, in general

Identification:

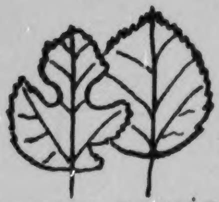
Leaflets: 5, palmately compound, elliptic (or nearly so in shape, lateral ones are often lopsided, dark, dull green, 2" to 6" long)

Stems: all are brown and somehwat toughened, young stems are green to red or brown, smooth, flattened and somewhat finely grooved

Additional information:

Bark has been used in domestic medicine such as tonics, expectorants, and as a remedy for dropsy.

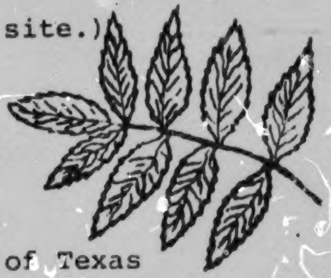
#11
Shumard Oak (31.1)
(same description as #3)



#12
Common name: Red Mulberry (8.5)
Scientific name: *Morus rubra*
Found: fertile soils, central Texas
Identification:
Leaves: 3" to 5" long, 2" to 3" wide with coarse marginal teeth. Sandpapery above and hairy beneath; often lobed.
Twigs: hairless or slightly hairy
Bark: mature tree is dark, reddish-brown with scaly plates, but smooth ridges
Size: height 30'-60', diameter 1'-3'
Fruit: red-black, purple, blackberry like
Additional information:

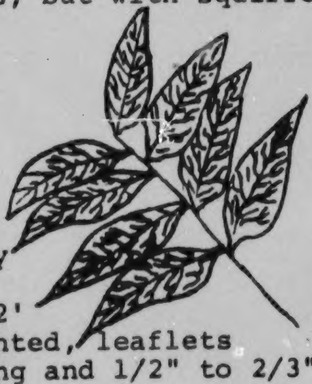
Wood has been used for boats, fencing , and railroad crossties. The Indians even used the fibrous bark to make cloth. The delicious fruit is eaten by 20 species of birds, squirrels, and even foxes. The berries can make a pleasing sweet drink (mildly laxative), used for pies, preserves, jams or jellies, or eaten raw as hunters often do. The tree is often used in park or yard planting; it has dense shade.

(This is the only red mulberry marked on the site.)



#13
(is located 4 m. north. Why did the limbs break off and die? [wind damage])
Common name: Black Walnut
Scientific name: *Juglans nigra*
Found: woods, in general; eastern part of Texas
Identification:
Leaves: 7-17 narrow toothed leaflets slightly hairy beneath
Twigs: hairless, stout, light brown
Bark: dark and deeply grooved, ridges dull
Size: height 70' to 100', diameter 2'-4'
Fruit: large spherical nuts with husks of 1 piece
Additional information:

Wood valued for veneers and cabinets. Bark has been used in tanning. The nuts are not only popular with humans, but with squirrels and mice.



#14
Common name: Soapberry (13.1)
Scientific name: *Sapindus sp.*
Other names: Wild China, Western Soapberry, Wild Ligustrum
Found: bottomland, especially moist clay
Identification:
Size: heighth 40' to 50', diameter 1' to 2'
Leaves: 4 to 9 pairs of narrow, sharply pointed, leaflets which are pale yellow-green, 2½" long and 1/2" to 2/3" wide
Flowers: whitish
Fruit: round, yellow berries ½" in diameter with dark brown seeds
Bark: broken by deep fissures into long narrow plates, scaly

Additional information:
Pulp of fruit is reportedly poisonous and forms lather in water (like soap). The wood has been used for baskets and pack saddles. Varnish and floor wax manufacturers use the pulp.

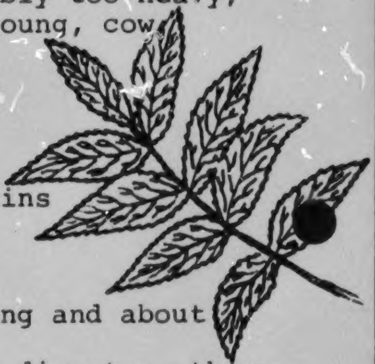
The tree south of soapberry is privet (10 m.). 20 m. away is a rusty blackhaw and a green ash.

Note oak stumps growing 5 m. to right of trail. Perimeter trail crosses Shiloh to north. Why are the trees gone? (road cut, Shiloh coming through)

Note the temperature difference as you move out of the forest.

#15
Bent pecan. Why do you think this is so? [Was probably too heavy; wind, fence pulled over, log washed up against when young, cow, leaned on...]

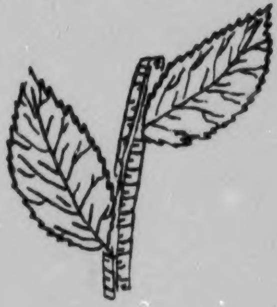
Common name: Pecan
Scientific name: *Carya illincensis*
Also known as: state tree of Texas
Found: throughout central Texas, flood plains
Identification:
Size: reaches over 100'
Shape: large, symmetrical top
Leaves: 9 to 17 leaflets which are 4" to 8" long and about 2" wide, deciduous, yellow in fall
Fruit: a nut, 1" or 2" long, and ½" to 1" in diameter, thin husk that opens along seam when nut is ripe
Additional information:
Good shade tree; nuts valuable crop; wood brittle, but used in furniture; hulls have been used for dye; name "pecan" is from Indian word "pecaune". There are about 100 species of this tree cultivated in the southeast.



20 m. west of post #15 is a Box Elder.

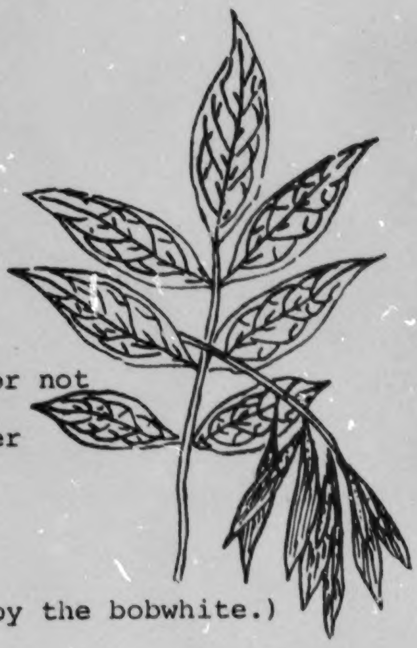
LOOP A
#16
(Cedar elm with barbed wire inside it. A smilax (greenbriar) vine is growing up left side.)

Common name: Cedar Elm
Scientific name: *Ulmus crassifolia*
Found: most common elm in Texas



Identification:
Size: height up to 75'; diameter 2' to 3'
Bark: light brown, tinged with red and deeply fissured
Twigs: finely velvet, reddish
Leaves: less than 2" and often double toothed, rough upper surface stubb hairy, yellow in fall
Flowers: small, clusters in autumn
Fruit: 1/4" long, hairy

#17
Common name: Green Ash (25.1)
Scientific name: *Fraxinus pennsylvanica*
Found: Georgia to Texas
Identification:
Size: height 60'-70', diameter 2'-3'
Bark: tight and deeply furrowed
Twigs: hairless, mostly shiny
Leaflets: 5-9, green on both sides, toothed or not
Flowers: during April and May
Fruit: wedge-shaped, September and November



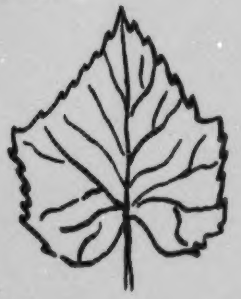
LOOP B
#18
Sugar Hackberry
(Refer to #2. The fruit (sugarberries) is eaten by the bobwhite.)

#19
Bois-d'Arc with sapsucker holes
(Refer to #1.)

What has occurred on the left half? (probably cut was made for fence post)

Notice the huge grapevine to the left by the creek.

Common name: Grape Vine
Scientific name: *Vitus*
Identification:
Leaves: toothed, heart-shaped, often lobed
Vine: climbs high by tendrils
Stem: dark



STATION B
Rowlett Creek

By means of the ladder go down to the water. Disturbing the creek as little as possible, look for life in water. Lift rocks, look, and replace.

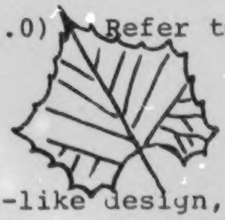
Notice the erosion. Why is it worse on the left side than on the right side? Notice the exposed roots.

Why is the water moving faster at some points than at other points? Does this effect the amount of erosion? This is a good place for a streamboat race. Look closely. Can you see a soil profile? Does the soil appear all one color or is it in colored layers? Do you see any fossils?

If the creek bed is dry, why? What happened to the animal life that was in the creek when it was flowing? When water is here again how will new plants and animals get here?

Do you think that this might be the home of water moccasins? Why? Many snakes have been seen in the water. What other kind could they be?

#20
(Sycamore east [Tree with wire is Red Mulberry (8.0) Refer to #12.])



Common name: Sycamore (28.5)
Scientific name: *Platanus occidentalis*
Found: streambanks, bottomlands
Identification:
  Size: height, 50'-130'; diameter, 3'-8'
  Bark: brown, flakes off in jigsaw puzzle-like design, musky smell, white underneath
  Leaves: 3-5 lobed, edged with large teeth, measure 6"-10"
  Flowers: small, in globose heads
  Fruit: small, hairy, in tight, brown, long-stemmed hanging balls
Additional information:

The wood is used for boxes, barrels, butchers' blocks, and furniture. Indians used trunks for canoes.

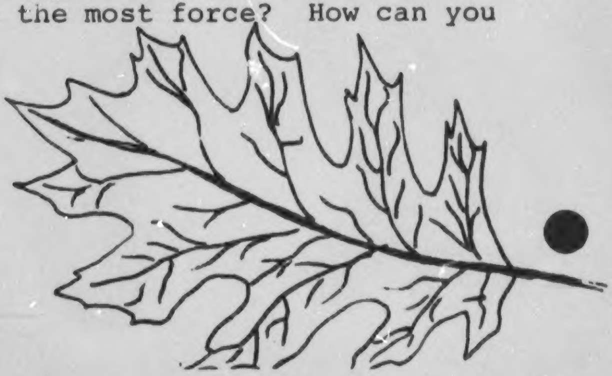
#21
Common name: Black Walnut (31.3)
(Refer to #13. Tomatoes and apples may not survive near a black walnut.)

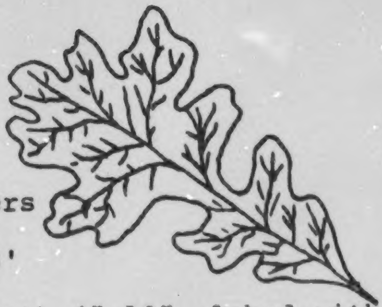
#22
(This is the biggest tree on the west side of the creek.)
Common name: Shumard Oak (39.3)
Scientific name: *Quercus shumardii*
Found: bottomlands and moist soils, mostly Coastal Plain
Identification:
  Size: height, 70'-100'
  Leaves: mostly over 6" long
  Fruit: acorn cup, gray, fine, hairy, shallow, saucerlike, 3/4"-1 1/2" in diameter

LOOP A

Goes up the gravel. This is a good place to see roots and morain. Where does water flow fastest and have the most force? How can you tell?

LOOP B
#23
Shumard Oak (36.7)
(Refer to #22)



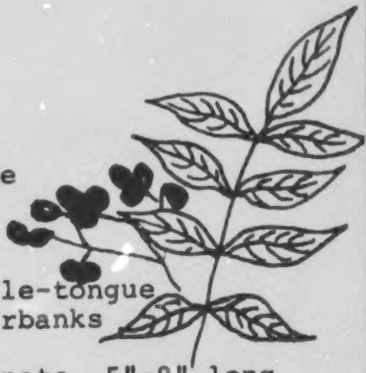


#24
Common name: Bur Oak
Scientific name: *Quercus macrocarpa*
Other name: Mossycup oak
Found: rich woods and prairie borders
Identification:
Size: height, 70'-80'; diameter, 2'-3'
record height 170'
Leaves: somewhat hairy and whitish beneath 4"-10", lobed without bristle-tips
Bark: light gray, shallowly grooved
Fruit: acorn cups are bowl shaped, largest acorn in the white oak family

#25
Bois-d'Arc (38.7)
(Refer to #1. Use caution: The overflow deposits create a good place for copperhead snakes.)

Go down the trail about 15 feet and look to your left (East) and you will find an Eve's Necklace (small tree).

#26
Black Walnut (24.4)
(Refer to #13)



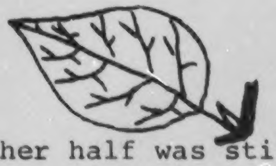
#27
(The gall on the tree formed as tree tried to overcome insect damage; tree now dead.)
Common name: Prickly Ash (7.8)
Scientific name: *Xanthoxylum clava-herculis*
Other names: toothache tree, Hercules-Club, tingle-tongue
Found: old fields, fertile woods, and riverbanks
Identification:
Leaves: deciduous, pinnately compounded, alternate, 5"-8" long
Leaflets: 7 - 19 on each leaf, 1 to 2½ inches long, bright green upper surfaces, paler underneath side, and somewhat hairy, margins are toothed
Twigs: gray to brown, contain stout, sharp spines which are 1/2 inch long
Bark: light gray, studded with stout spines
Flowers: small green, in early spring
Fruit: small, one-seeded carpel, rippens in early spring
Additional information:

Bark and leaves contain juices used as a treatment for rheumatism, a gastro-intestinal stimulant in cases of flatulence (bloated stomach) and diarrhea, and an anesthetic to stop toothache.

Why is there nothing but grass and small trees to the right of the trail?

Notice the trash in the creek and the Mexican plum tree 3 feet to the right of the trail.

Look at the amount of roots exposed as compared to the amount of tree above ground. Are they equal in amount?

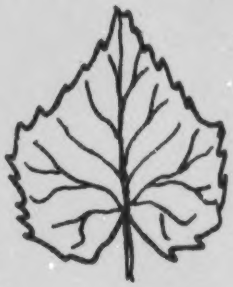


#28
A split tree (Bois-d'Arc)
The water broke. One half moved while the other half was still in the ground.

#29
Green Ash (14.0)
(refer to #17)

#30
Bur Oak (23.5)
(Refer to #24. Notice shelf fungi on ash on the right. Look through the trees and you will see the big fallen log you saw earlier.)

#31
Common name: Wild Grape
Scientific name: *Vitis sp.*
Identification:
Leaves: large, unlobed to deeply lobed, wooly when young
Fruit: small, ripe in fall
Form: vine



#32
Fallen log, shelf fungi, and wood borers
Why is there a rope barrier?

To the left and in the creek there is a log. How did it get there? How long will it stay there? It caught a Bois-d'Arc log; what will happen if it snares other logs?

#33
Pecan tree (32.0) with poison ivy
(Refer to #15)

#34
(Look to the left. Why is it so clear under the trees? [It has been mechanically cleared by the Girl Scouts] This one does not have as many thorns as usual.)

Common name: Honey Locust (9.8)
Scientific name: *Gleditsia triacanthos*
Found: grows naturally in the eastern part of the state over to the Brazos River. It is planted in drier parts of Texas because of its tolerance to a variety of soil and moisture conditions.
Identification:
- Size: height 75 feet, diameter 30 inches
- Bark: on old trees is dark gray and divided into thin tight scales
- Thorns: shiny thorns grow on one year old wood and remain for many years
- Leaf: pinnate, each 6 to 8 inches long
- Fruit: pod 10 to 18 inches long, often twisted and dark brown or black when ripe. Seeds of the pod are hard and separated by pulp.

Additional information:

The seed pods serve as food for many animals and, since they are hard to digest; many are widely scattered from the parent tree. The wood is used for fence posts, wheel hubs, and in construction.

Shiloh Road

Note the succession. What is growing back first? What kind of tree is coming back first? (plants first, cottonwood first trees)

#35
Clearing

Why is there no grass? Why so clean? (overflow and water stood) Large trees are left and the small trees have died. Note the swelling at the bottom of many trees.

#36
Bois-d'Arc with sapsucker holes (Why are there no plants underneath? Could it be lack of light?)

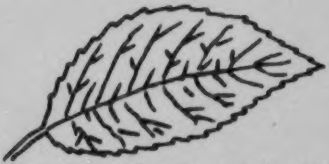
Common name: Yellow-Bellied Sapsucker
Scientific name: *Picidae sphyrapicus*
Found: United States and Canada during warm weather; flies to Central America for winter.
Additional information:

They get their name because their diet includes tree sap, which they get by making holes in the bark. They also eat ants and wild fruit. They sometimes injure trees.

Watch for fence row in the trees.

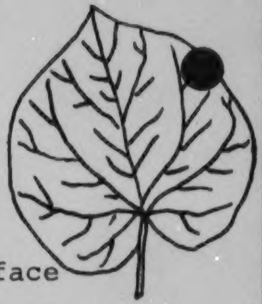
Why do you think the barbed wire tree burned? (maybe lightning) See how big it used to be. It filled the wire. The posts are Bois-d'Arc.

Forty-five paces after #36 and to the right is a possum haw.



#37
Common name: Mexican Plum (1.5)
Scientific name: *Prunus mexicana*
Identification:
Size: large shrub size 20-25 feet high and 8" to 10" in diameter
Bark: dark gray to nearly black
Leaf: oval, abruptly pointed, finely and doubly toothed, yellow-green, shiny, thick, firm
Flowers: white, small clusters in March
Fruit: (plum) purple-red, 1¼" in diameter and varies in palatability
Additional information:

Does not form thickets, is drought resistant, and has been used for grafting stock for the production of commercial plums.



#38
Common name: Eastern Redbud (1.5)
Scientific name: *Cercis canadensis*
Found: scattered throughout the woodlands of East Texas westward to the Brazos River
Identification:
Size: height 25' to 50', diameter 6" to 12"
Bark: long narrow plates with bright red-brown surface separating into the scales
Leaves: alternate, heart-shaped, entire, 3" to 5" long and glossy green color
Flower: bright, purplish-red, clusters, early spring
Fruit: reddish, oblong, flattened, many sided, 2"-4" long
Additional information:

Flowers are sometimes eaten in salads. Red roots yield a dye. Only bobwhite and a few songbirds are known to eat the seeds. Buds have been used in treatment of diarrhea. Some Indian tribes have used the flexible bark in weaving.

*Don't go backward over trail #2; steps are dangerous to go down.

Plan trip to go west and north up trail and up steps.

The amphitheatre was constructed to blend with the natural environment. The shape of the area was already here; we did not dig it out. A Soil Conservation Service survey shows a quarry was once here. Speculation exists that it also could have been a lake. No one knows exactly why this area is shaped as it is. What do you think?

The poles are to sit on and to help control erosion. A light sprinkling of bark chips covers the dirt. It helps keep weeds and dust down.

To help keep the area as clean and natural as possible, please remove all trash after eating lunch here.

Why is the hole in the trail? (most likely a tree or stump was removed)

Why has the trail been lined with natural things?

After going up the steps, look around to the left; you may see animal life.

#39
Cedar Elm (23.4)
(Refer to #16. This tree reaches its largest size along the Trinity and the Guadalupe Rivers.)

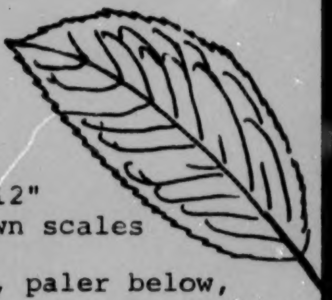
#40
Pecan (26.0)
(to the right of the trail. Refer to #15.)

#41
Bois-d'Arc (26.7)
(Refer to #1. Before barbed wire was invented this species was planted for living fences.)

#42
Prickly Ash (9.3)
(Refer to #27. Inside the bark there is an aromatic, strong, pungent juice that was used by the Indians and pioneers to reduce toothache pain.)

#43
Grapevine
(Refer to section following #19.)

#44
Pecan (26.6)
(with big vines on it. Refer to #15.)

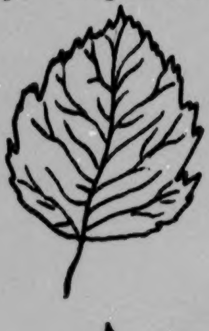


#45
Common name: Rusty Blackhaw
Scientific name: *Viburnum rufidulum*
Found: woods and thickets over East Texas
Identification:
Size: height, 35'; diameter, usually less than 12"
Bark: roughened into small plate-like, dark brown scales tinged with red
Leaves: simple, dark green, leathery, shiny above, paler below, red hairs on veins, margins finely serrate
Flowers: small, white, in spring
Fruit: bluish-black drupe (a fleshy fruit with a pit)
Wood: bad smelling, no economic use
Additional information:
In winter the buds are covered with rusty brown hairs.

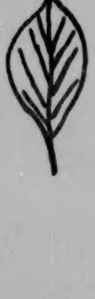
#46
Soapberry (5.2)
(Refer to #14)

Twelve paces from #46 there are woodpecker holes in the cedar elm on the right side of the trail.

#47
Common name: Red Haw
Scientific name: *Crataegus sp.*
Found: a wide variety of conditions and places
Identification:
Leaves: 1"-1½" long, toothed on rounded top, simple alternate
Form: small shrub or tree
Wood: strong, hard, heavy
Bark: sometimes flaky, thin, gray
Flowers: in spring, white
Fruit: roundish, pulpy, sweet
Additional information:
Many birds eat fruit and nest in bushes.



#48
Common name: Swamp Holly
Scientific name: *Ilex decidua*
Identification:
Leaves: alternate, bunched at twig tops
Twigs: alternate
Form: small to medium-sized shrub
Fruit: bright orange-red, matures in autumn



#49
Pecan
(Refer to #15.)

How do you distinguish poison ivy root from Virginia creeper root? (Poison ivy has the aerial rootlet)

#50
Mexican Plum (3.3)
(Refer to #37.)

#51
Sugar Hackberry (26.0)
(Refer to #2, Cedar Elm (17.7) to the right.)

#52
Shumard Oak (25.0)
(Refer to #3.)

#53
Shumard Oak (22.3)
(Refer to #3, note rotting Bois-d'Arc 10 m. west of #53.)

#54
Bur Oak (18.0)
(Refer to #24. It has the largest leaves of any of the Texas oaks and produces acorns which sometimes reach a diameter of more than 2". It is probably the most easily grown of all the oaks as when the matured acorns are planted they will germinate at once.

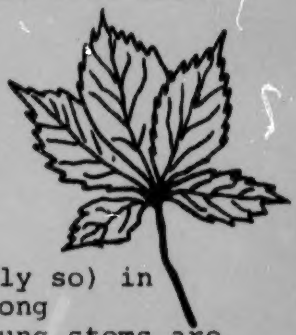
#55
Cedar Elm (13.9)
(Refer to #16.)

#56
Decomposing log in advanced stage
(Notice that there has been some destruction by animals.)

E. INNER TRAILS

Trail 1

On the left there is a clearing. How do you feel it occurred? Do you feel a change in the temperature? Look around you. Why is plant growth heavier in some areas? You are now about 25 feet from the start of the trail. What sounds do you hear here?



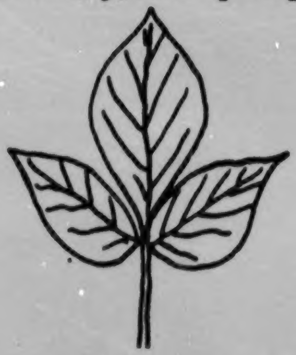
#57
Common name: Virginia Creeper
Scientific name: *Parthenocissus quinquefolia*
Found: many places on site
Identification:
Leaflets: 5, palmately compound, elliptic (or nearly so) in shape, dark, dull green, 2 to 6 inches long
Stems: old are brown and somewhat roughened, young stems are green to red or brown, smooth, flattened, and somewhat finely grooved
Additional information:

Bark has been used in domestic medicine, such as tonics, expectorants, and as a remedy for dropsy.

Common name: Poison Ivy
Scientific name: *Rhus toxicodendron*
Found: many places on site
Identification:
Leaflets: 3 parted, compound, usually ovate, vary greatly in shape and size, leaf margins may be smooth, slightly pointed or deeply lobed. Tip is pointed. Base is either slightly pointed or deeply lobed.
Stems: old are thick and hairy; may be 6" in diameter
Flowers: small, greenish
Berries: white, grayish white
Additional information:

It is used in making varnish. The berries are eaten by birds. Birds can eat it; in fact, no animals seem to be affected by it but man, apes, and monkeys. Seven out of ten people will have an allergic reaction to it. Those presently "immune" can lose their immunity at any time. The poisonous oil contained in all parts of the plant will cause a blistery rash, burning and itching. If you feel you have come in contact with it, wash well with hot water and soap. Use care in removing shoes and clothing,..they may infect you.

REMEMBER: "Leaflets three--let it be!"



#58
Common name: Bur Oak
Scientific name: *Quercus macrocarpa*
Found: many places as it grows so easily
Identification:
Leaves: largest of any Texas oaks
Acorns: largest of any oak, can get up to 2" diameter, germinates at once
Size: 4" to 6" diameter in 10 years
Additional information:

The ashes of the bark were once used in tanning.

#59
Common name: Pecan
Scientific name: *Carya illinoensis*
Other name: State tree of Texas
Found: throughout Central Texas
Identification:
Size: height - 100'
Shape: large, symmetrical top
Leaves: 9 to 17 leaflets which are 4" to 8" long and about 2" wide, deciduous, yellow in fall
Fruit: a nut, 1" or 2" long and ½" to 1" in diameter, thin husk that opens along seam when nut is ripe
Additonal information:

A good shade tree; nuts valuable crop; wood brittle, but used in furniture; hulls have been used for dye; name "pecan" is from Indian word, "pecaune".

#60
Rotting log

The little fence is to keep decomposition from being disturbed. What decomposers do you see working? What effect would man have on the decomposition by touching it and climbing on it?

Bear to right. (Trail #3 comes off to the far left (east); trail #2 comes off at an angle later on.)

LOOP B - STATION C
Photographic Site

Why is this clearing here? Alot of animals come out to sun, so it is an excellent place to take pictures. It is also a good place to observe the changes in temperature, air movement, sounds, etc.

#61
Bent Pecan tree (one in front and one behind)

Why do you think it is bent? Why do you think woodpecker holes are up and down rather than horizontal as they usually are?

#62
(Tree to south is forked pecan. Other is:)
Common name: Mexican Plum
Scientific name: *Prunus mexicana*
Other name: Wild Plum of Eastern Texas
Identification:
    Leaves: 2" to 3" long, resembles an elm's leaf
    Flowers: in spring, early, white
    Fruit: plum
Additional information:
    excellent to use in roadside and park work

#63
Common name: Prickly Ash (6.8)
Scientific name: *Xanthoxylum clava-herculis*
Other names: "toothache tree", Hercules-Club
Identification:
    Leaves: deciduous, 5" to 8" long, pinnately compounded, alternate bright green upper surfaces, margins are toothed, underneath paler and somewhat hairy
    Twigs: gray to brown studded with stout spines
    Flowers: green, bloom early spring
    Fruit: small, 1-seeded carpel which ripens in early summer
Additional information:
    park and roadside plantings; medicinal: anesthetic to stop tooth pain, for rheumatism, gastro-intestinal stimulant, tonic antispasmodic.

At the end of the trail is a dead honey locust (see #68).

Trail 2

As you enter this trail notice the evidence that there has been a road here in the past. Do you think this was a logging road, a cattle trail, or a stagecoach trail? Could this be the trail that Collin County settlers used to travel north and south?

What do you suppose the pioneers did with their trash? Notice the old dump on the right side of the trail. The glass has turned blue. Why? (Long exposure to the sun will turn glass to shades of blue and purple.)

#64
(grew up in the middle of the old road)
Common name: Prickly Ash (17.0)
Scientific name: *Xanthoxylum clava-herculis*
Other names: "toothache tree" and Hercules-Club
Found: old fields, fertile woods, and riverbanks
Identification:
Leaves: deciduous, pinnately compounded, alternate, 5"-8" long
Leaflets: bright green upper surfaces, paler underneath side and somewhat hairy, margins are toothed
Twigs: gray to brown, contain stout, sharp spines which are ¼" long
Bark: light gray, studded with stout spines
Flowers: small green, in early spring
Fruit: small, one-seeded carpel, ripens in early spring
Additional information:

Bark and leaves contain juices used as a treatment for rheumatism, a gastro-intestinal stimulant in cases of flatulence (bloated stomach) and diarrhea, and an anesthetic to stop toothache.

There's another prickly ash to the left of the trail that is older. How can you tell? (The knots are worn down.) Note the changes in the terrain, the old fence row, and greenbriar.

Common name: Greenbriar
Scientific name: *Smilax bona-nox*
Identification:

deciduous, spiny, climbing vine with tendrils, simple leaves, usually thick and often blotched with white

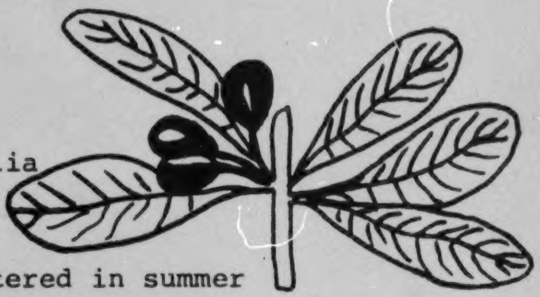
#65
Common name: Black Walnut (11.5)
Scientific name: *Juglans nigra*
Found: usually in rich bottomlands and moist fertile
Identification:
Size: height may reach 100'
Bark: thick, dark brown, divided rather deep fissures into rounded ridges
Leaves: alternate, compound, yellowish-green color
Fruit: nut covered by a green husk which does not split open. The nut is black with a very hard, thick, finely ridged shell
Wood: dark purplish-brown, heavy, hard, strong
Additional information:

East of San Antonio, Texas, it grows big enough to be used for lumber. Wood is valuable for interior finishing. This wood is becoming rare. Rich, oily nut is a favorite of many people

#66
Common name: Grape Vine
Scientific name: *Vitus*
Identification:
Leaves: toothed, heart-shaped, often lobed
Vine: climbs high by tendrils
Stem: dark
Additional information:

The fruit is used for jelly and drinks. Wildlife likes the fruit. The fruit grows only on 1 year old wood.

Trail 3



#67

Common name: Chittamwood (10.5)
Scientific name: *Bumelia lanuginosa*
Other names: false buckhorn, gum bumelia
Found: sandy woods with stream
Identification:
Branches: short, stout, with spines
Flowers: small single or 2 to 3 clustered in summer
Fruit: falls in autumn
Seeds: shiny, light brown, round
Wood: light, brown, white streaks, close-grained, heavy
Size: height to 80' and diameter to 3'
Additional information:
only one marked on site

#68

Common name: Honey Locust
Scientific name: *Gleditsia triacanthos*
Other name: needle tree
Found: eastern part of Texas to Brazos River
Identification:
Size: height to 75' and diameter 30"
Bark: dark gray and divided into thin, tight scales on old tree, shiny thorns grown on 1 year old tree and remain several years
Leaf: pinnate, 6" to 8" long
Fruit: pod 10" to 18" in length, often twisted and dark brown or black when ripe
Seeds: hard, separated by pulp
Additional information:

Animals eat seeds and since they are hard to digest, many get scattered from parent trees. Bees use sweetners of flower for honey.

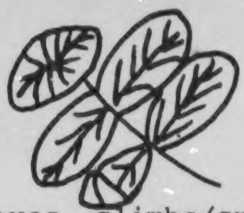
Uses:
Wood: fence posts, wheel hubs, construction
Food: make drink, ground into meal, eaten raw. Indians used needles to sew buckskin, etc.

#69

Common name: Prickly Ash (11.5)
Scientific name: *Xanthoxylum clava-herculis*
Other names: "toothache tree", Hercules Club
Identification:
Leaves: deciduous, 5" to 8" long, pinnately compounded, alternate with bright green upper surfaces, margins are toothed, underneath paler and somewhat hairy
Twigs: gray to brown studded with stout spines
Flowers: green, bloom early spring when leaves half grown
Fruit: small, one-seeded carpel which ripens in early summer
Additional information:

Used for parks and roadside plantings. Medicinal Uses: anesthetic to stop toothpain (thus named), for rheumatism, gastro-intestinal stimulant, tonic, antispasmodic

#70



Common name: Honeysuckle
Scientific name: *Lonicera*
Identification:
- Vine: evergreen with opposite leaves, climbs/creeps without tendrils or aerial rootlets
- Stems: full less so with age, become hollow
- Leaf: narrow, flat, margins commonly entire but occasionally toothed to lobed
- Flowers: fragrant, in pairs from leafy branches, white or pink, later yellow, June to August
- Fruit: black pulpy berry with several seeds, September to March

Additional information:

General Uses: holding bank, fragrance, antidote to bee stings, Appalachian Area (emetic, cathartic, alleviates asthma and other lung troubles)

#71
Common name: Green Ash (25.1)
Scientific name: *Fraxinus pennsylvanica*
Found: Georgia to Texas
Identification:
- Size: height 60'-70', diameter 2'-3'
- Bark: tight and deeply furrowed
- Twigs: hairless, mostly shiny
- Leaflets: 5-9, green on both sides, toothed or not
- Flowers: during April and May
- Fruit: wedge-shaped, September and November

STATION D
the Beetree

Please observe the activities of the bees in and around the tree. For bees to be building in a tree, still alive, is odd. They are also building lower than usual. See how the workers are in and out. For your safety, please stay on this side of the fence. If a bee should light on you, brush it off, don't swat. This will lessen the chances of getting the stinger in you.

#72
(Cedar elm with knots where limbs have grown over.)
Common name: Cedar Elm
Scientific name: *Ulmus crassifolia*
Found: most common elm in Texas
Identification:
- Size: height up to 75'; diameter 2' to 3'
- Bark: light brown, tinged with red and deeply fissured
- Twigs: finely velvet, reddish
- Leaves: less than 2" and often double toothed, rough upper surface stubb hairy, yellow in fall
- Flowers: small, clusters in autumn
- Fruit: 1/4" long, hairy

#73

Common name: Soapberry
Scientific name: *Sapindus sp.*
Found: moist clay
Identification:
  Size: 40' to 50' high and 1' to 2' in diameter
  Bark: broken by deep fissures into harrow plates in which turn are broken
  Leaves: 4 to 9 pairs of alternate, opposite or both, lance-shaped leaflets, pale, yellow-green, 2 1/2" long and 1/2"to 2/3" wide, fall in autumn
  Flowers: whitish, large dense panicles

Trail 4

This trail has no numbered posts, stations, or bark chips. It is in a very natural state. The trail may be used as a short cut from the perimeter trail to the road cut. Midway on trail 4 is an excellent area for trapping. The major changes in this trail have been made by flood water, not man. It is not hard to imagine how the area must have looked in Rowlett's time when you are on this trail.

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OUTLINE TO SECTION II

II. Teacher Information

The background of the teachers using this outdoor area varies almost as widely as that of the students. Students will range from K-12; they will be from all over the country. To assist teachers in better understanding procedures and to provide some additional information about the Rowlett environment, this section is included. It is hoped that this section will help bridge the gap in backgrounds.

A. Permission Form Sample

B. Student Preparation

    1. What to wear

    2. Permission form importance

        a. Signature and number

        b. Inform parents

        c. Inform teachers

    3. Outdoors behavior

        a. Safety

        b. Conservation/preservation

        c. General rule

C. Emergency Procedure

    1. Emergency treatment

    2. Accident form

D. Supplemental Material for Teachers

    1. Plant

        a. Other tree information

        b. Plants planted

    2. Animals

        a. Reptile/amphibians

        b. Fish

        c. Bird

        d. Mammals

3. Other
    a. Geology
    b. Soil
    c. Watershed

E. Bibliography

A. PERMISSION FORM

I give my permission for ________________________ to go to the
(child's name)
Plano Outdoor Learning Center on ________________________________.
(Date to be filled in by teacher)
I understand that the students will be transported to and from the Center by school bus and will be supervised by Plano Public School teachers.

In case of an emergency, I may be reached at the following telephone numbers:

_________________________________(mother)

_________________________________(father)

I give my permission for the employees of the Plano Independent School District to administer emergency medication or treatment to ___________________________ if such emergency medication or
(Child's name)
treatment should become essential because of accident, injury, or illness while my son/daughter is at or on the way to or from the Plano Outdoor Learning Center.

I understand that such permission releases the employees of the Plano Independent School District from liability under the provisions of Senate Bill 1025 as adopted by the 65th Session of the Texas Legislature.

If I cannot be reached, or the emergency does not permit time to call, I give the teacher permission to take my child to a physician for medical attention.

____
(Insurance Company)

____
(Parent's signature)

____
(Policy Number)

Permission form (continued)

Please list any allergies or medical problems that we should know about your child.______________________________

____

____

PARENT INFORMATION LETTER

The ____________class at the __________________ (School name) School will go to the Plano Outdoor Learning Center on __________________ (Date)

for the purpose of______________________________________. Transportation will be by school bus.

The Plano Outdoor Learning Center is a heavily wooded area along a creek. The trails and stations are clear; yet the students must wear long pants and closed shoes. If the students have high top shoes or boots they should wear them.

Poison Ivy is growing off the trails; some snakes have been seen. We will take every precaution to see that the students have an educational and safe trip.

Please return the permission form to __________________ (teacher's name) as soon as possible. Students without written permission will not be allowed to participate in this activity.

B. STUDENT PREPARATION

1. What to wear
   - a. Long pants to prevent scratches and poison ivy contact. Pants over boots since a snake bites the fabric first and starts closing mouth for purpose of venom injection.
   - b. Closed shoes and socks are a must. High top shoes would give good ankle support for the long sloping terrain.
2. Permission form importance
   - a. Students without written permission will not be allowed to participate.
   - b. Parents must be informed about details of the trip. Use of a letter such as the parent information letter is suggested.
   - c. Teacher information
     1. Directions to the Outdoor Center:
        Go east on Park Blvd. to Peachtree.
        Turn left on Peachtree.
        When Peachtree makes a sharp left turn, go right and jump the curb slowly at an angle.
     2. Take permission forms with you to the Outdoor Learning Center.
     3. Closest medical clinic is 1410-14th street, 423-4591.
     4. Closest permanent telephone--other than residents--Bowman Middle School.
     5. Phone booth--7-11--Park and Jupiter.
     6. The Plano Police/Ambulance telephone number is 424-5678.
     7. Environmental Education Coordinator has a First Aid Kit complete with Snake Bite Kit that must be taken with each group.
     8. Take large trash bag to bring lunch trash back to school.
     9. Give list of equipment needed from Central Office to the Enviromental Coordinator in advance of field trip.

c. Teacher Information (Continued)

10. Take drinking water or have students bring beverages if you feel you'll be there long enough to need it.

3. Outdoor Behavior
   a. Safety-Preventive Behavior
      1. Never thrust your hand or kick your foot where the eye cannot see.
      2. Roll log toward you in order that creatures can escape away from you.
      3. If you feel something crawling over your body, do not swat, but brush! (Catch it by surprise and remove it before the damage can be done)
      4. Prevent a possible bite or sting from occuring by respecting the animal. Move slowly; sudden movement will cause a rattlesnake to strike.
      5. Stay on trails; don't take shortcuts.
      6. Identify and avoid poison ivy.
      7. Do not taste any plants on trail. Even some familiar plants can be toxic.
      8. Refrain from feeding animals.
   b. Conservation/Preservation Behavior
      1. No smoking.
      2. Leave wild flowers for others to enjoy.
      3. Sliding on creek bank will cause erosion.
      4. No fires.
      5. All litter should be placed in litter barrels. Large groups should take their lunch trash back to school in a plastic trash bag. All eating needs to be done in clearing or amphitheater.
      6. No vehicles on trails.
   c. General Rules
      1. Leave the center in as good or better condition than it was when you arrived.

C. EMERGENCY PROCEDURE

1. Emergency treatment

a. Bites

(1) Insect Bites and Stings

1. Compress of ammonia water
2. Antihistamine cream or ointment best (Caladryl, P.B.Z., others)

Bee and wasp stings - cold compresses; slow absorption from the sting.

FOR PEOPLE KNOWN TO BE ALLERGIC TO BEE OR WASP POISON or other allergies to specific insects: Apply ice and get medical attention.

(2) Snake Bite

PREVENTION:

1. Watch where you step
2. Watch where you sit
3. Watch where you place your hands
4. Wear stout boots, pants over boots--snake bites fabric first and starts closing mouth for purpose of venom injection (rattle)
5. Take care--climbing fences--picking berries and flowers

SYMPTOMS:

1. Pain is immediate if pit viper venom (rattlesnake, copperhead, and cotton mouth/water moccasins)
2. Discoloration and swelling quickly
3. One or two puncture wounds and may introduce tetanus germs as well as venom. With absorption of poison:
    a. general weakness
    b. shortness of breath
    c. nausea and vomiting
    d. weak and rapid pulse
    e. dimness of vision
    f. unconsciousness may occur

FOLLOW DIRECTIONS ON SNAKE BITE KIT:
Emergency measure must be taken at once. Although the victim should be taken to a hospital as quickly as possible, certain emergency treatment cannot wait, since waiting may permit the poison to spread.

WELCH SNAKE BITE KIT DIRECTIONS:

1. **SEND FOR THE NEAREST PHYSICIAN.** Medical attention must be obtained as soon as possible for any snake bite.

2. Have the victim remain quiet and calm. Give no stimulants. Keep the bitten limb still and lowered below the level of the heart. If medical attention is not immediately available, proceed with the following steps.

3. Apply the constricting band about two inches above the bite, between the site of the bite and the heart. Tighten it just enough to prevent the return flow of blood in the surface vessels, but not tight enough to stop the arterial flow or the pulse. The pulse can be checked by placing two fingers, not the thumb, over the pressure point in the wrist or ankle, as appropriate. If properly adjusted, the wound will ooze somewhat. Never apply the constricting band around a finger or toe. Loosen the band for one minute every ten minutes. Reapply slightly higher, in advance of the swelling. If the band causes numbness or pain, loosen it. If the bite is in an area where the band cannot be applied, simply proceed with the remainder of the procedure. CAUTION: DO NOT TIGHTEN THE BAND ENOUGH TO SHUT OFF THE ARTERIAL BLOOD SUPPLY. REMEMBER: YOU ARE NOT APPLYING A TOURNIQUET. Actually, any article of clothing, such as a belt, necktie, stocking, or shirt can serve as a constricting band.

4. Observe the victim for signs of difficult breathing. Should breathing stop, artificial respiration should be initialized.

5. Remove the antiseptic swab from its cardboard sleeve. Crush the swab by pressing firmly between the thumb and index finger, saturating the cotton tip. Apply antiseptic to the wound area.

6. Sterilize the lancet blade with a match flame, or apply the anticeptic to the blade. Make crosscuts at the fang marks, about 1/4 inch long and 1/8 inch deep. Make the cross cuts shallower than the longitudinal cuts to prevent severing muscles and nerves. Beware of cutting nerves and muscles in the fingers, hands, wrists, or feet because they lie so close to the surface. Do not make incisions on fingers or toes, or over large visible veins. In this case, apply the pump to the fang mark, without incision.

(continued)

7. The venom pump is adaptable to three sizes of suction area (flat surfaces; smaller areas; between fingers and toes). Use the largest opening possible. Apply the pump to the fang mark or bite with the plunger in a closed position. Twist the knob counter-clockwise to release the pump. Remove and empty cup as it becomes filled with liquid. As mostly venom is to be removed, fluid should be blood-tinged. If fluid is extremely red-make new incision, adjacent to original, and repeat procedure. Continue suction at least one hour.

8. Use the ammonia inhalant as directed for faintness. It may be activated by crushing between thumb and index finger.

9. Adhesive bandages should be applied over incision when suction is complete.

(3) **Tick Bite**

Cover the tick with heavy oil (mineral, salad, or machine) to close its breathing pores. It may disengage at once; if not, allow the oil to remain in place for 1/2 hour. Then remove the tick carefully with tweezers, taking time so that all parts come away.

Gently scrub the area with soap and water.

b. **Blisters**

Do not puncture. Apply sterile dressing to protect against irritation. If broken, treat as an abrasion.

c. **Burns**

Minor: Immerse in cold water until pain is relieved.

Severe:
1. Cover with dry dressings
2. Do not apply any kind of ointment
3. Treat for shock
4. Obtain medical aid

d. Convulsions: (Epileptic seizure)

1. Keep calm (patient, too)
2. Do not restrain movements
3. Do not try to force anything into mouth.
4. Protect from injury by pad under head (moving objects away)
5. Loosen tight clothing
6. Turn person on side to allow saliva to run out of the mouth.
7. If very prolonged or repeated--secure medical aid.

e. Diabetes

Insulin Shock

Weakness, moist pale skin, drooling, drowsiness, intense hunger, vision problem, normal or shallow respiration. Acetone odor to breath.

a. obtain medical care.

f. Fainting

Put the patient on his back until complete recovery (approximately 10 minutes or more). Otherwise, he may faint again.

g. Foreign Body in Eye

Do not rub the eye. Tell the patient to look down. Grasp the lashes of the upper lid, pull out and down over the lower lid and hold in this position for several seconds. Repeat and if this does not help, look carefully under the lower lid on eyeball. If there is difficulty in removing object--cover the closed eye with a compress and consult a physician.

h. Foreign Body in Throat

If object can be seen, grasp it with fingers and remove. If the object cannot be reached, lift the child by the feet with his head down, and encourage the child to cough.

If object is swallowed--even though symptoms subside, check with a physician. If an object enters the lungs, it may cause a chronic cough or infection.

i. Fractures

Simple

1. Keep person warm and in a comfortable position.
2. Apply cold pack over painful area.
3. Be careful not to move injured parts in a manner that would cause further injury.
4. Immobilize with splint or sling.

Compound

1. Control bleeding with direct pressure.
2. Otherwise, do not disturb wounded area.
3. Cover with sterile dressing.
4. Have patient comfortable and warm.
5. Secure proper transportation for medical aid.

Dislocation

1. Do not attempt to put back into place.
2. Make comfortable.
3. Secure medical aid.

j. Lacerations

Minor--Wash with soap and water. Apply antiseptic and bandage.
Large--Use dressing and pressure over wound to stop bleeding. Bind dressing in place. Get medical help. Treat for shock

k. Nose bleed

Have person to sit up with head thrown slightly back--breathing through mouth. Have him press nostrils together firmly 4 to 5 minutes. Cold, wet compresses may be applied. If nose bleed continues, consult physician.

l. Plant poisoning

As soon after exposure as possible, wash the part with soap and water,then sponge with alcohol. Following this, Caladryl or P.B.Z. may be applied. If widespread--seek medical help.

m. Puncture wounds

Wash well. Allow to bleed freely. Apply sterile dressing and check regarding tetanus.

n. Shock or collapse

1. Keep person flat.
2. Keep warm but avoid overheating.
3. Elevate feet.
4. Check pulse frequently.
5. Allow to rest until recovery.
6. Secure medical help if symptoms persist.

o. Teeth

Chipped Tooth

Secure prompt dental care.

Permanent Tooth Knocked Out

1. Notify parent and send to dentist immediately.
2. Wrap tooth in compress (salt solution is best), and send it along to the dentist.

2. Accident form

Should an accident occur that requires a physician's treatment, make sure to report it to your principal. A Student Accident Report must be filled out. It will be important for you to remember as many details as possible to assist your principal in filling out the form completely.

D. SUPPLEMENTAL MATERIALS FOR TEACHERS

1. Plant

a. Other tree information

Common name: Boxelder
Scientific name: *Acer negundo*
Found: Eastern and Southern Texas
Size: Height 50 to 60 feet, diameter to 24"
Identification: Wood: Creamy-white, light, weak.
Bark: Grayish-brown, broad ridges
Leaves: Opposite, compound, 3 to 4 leaves.
Flowers: Drooping clusters
Fruit: Light brown

Common name: Red Cedar
Scientific name: *Juniperus virginiana*
Found: All over East Texas
Size: Height 40 to 50', diameter 1' to 2'.
Identification: Wood: heartwood red, sapwood white.
Bark: thin, reddish-brown
Flowers: bloom early spring
Fruit: pale blue, small, roundish
Additional Information: Use for chests, poles, posts.

Common name: Chinaberry
Scientific name: *Melia azedarach*
Found: All over Texas
Size: Height to 40'
Identification: Wood: fairly heavy and fairly hard
Bark: furrowed with ridges
Leaves: alternate, twice compound, 10 to 32" long.
Leaflets: alternate, shape varies
Flowers: lilac colored, fragrant, loose clusters
Fruit: roundish, small, fleshy, yellow.

Common name: Cottonwood
Scientific name: *Populus deltoides*
Found: along streams
Size: Height
Identification: Wood: soft, light-weight
Leaves: simple, alternate, coarsely toothed
Flowers: appear before leaves
Fruit: contain hairy seed, wind carries
Additional Information: easy to grow, messy, easily broken by wind.

Common name: Indian Current
Scientific name: *Ribes*
Found:
Identification: Leaves: 3 to 5 lobed maplelike leaves, alternate
Buds: winter, thin-scaled brown, leaf scars
Fruit: round, can be bristly
Additional Information: Birds and animals eat fruit.
Jam and jellies can be made.

Common name: Prickly Dewberry
Scientific name: *Rubus flagellaris*
Found: Thickets
Identification: Shape: shrub
leaves: thin, dull, light green, 5-parted, pinnate-compound
Flowers: white
Fruit: Black

Common name: Common Elderberry
Scientific name: *Sambucus canadensis*
Found: Canada to Texas
Identification: Leaflets: large, coarse-toothed, elliptic
Twigs: thick with spongy, white center
Flowers: small, white, thick clusters
Fruit: Small, juicy, round, purple-black
Additional information: Fruit used to make jams and jellies and pies.
Fruit is eaten by a wide variety of birds.
Size: Height 3' to 13', diameter 3/4" to 1".

Common name: Winged Elm
Scientific name: *Ulmus alata*
Found: Moist soil, eastern Texas
Identification: Size: Height-40' to 50', Diameter up to 2'
Wood: Heavy, hard
Bark: Light brown, shallow tissues
Leaves: simple, alternate, coarse, double-toothed
Flowers: early spring
Fruit: winged, small, covered with white hair

Common name: Greenbrier
Scientific name: *Smilax bona-nox*
Found: Swamps, thickets, woods
Identification: leaves: parallel-veined
flowers: small, greenish
fruits: Small berries
Additional Information: Fruit eaten by many birds. Rabbits eat stems.

Common name: Canada Moonseed
Scientific name: *Menispermum canadense*
Found: Stream banks
Identification: shape: rambling vine
leaves: large, lightly-lobed
flowers: white
fruit: black, grape-like
Additional Information: Fruit is poison. Don't eat!

Common name: Carolina Moonseed
Scientific name: *Cocculus carolinus*
Other name: Redberry moonseed
Found: Thickets
Identification: Shape: Vine
leaves: variable, various shapes, hairy.
flowers: green
fruit: red, pea-sized

Common name: Water Oak
Scientific name: *Quercus nigra*
Found: along swamps and streams
Identification: size: Height: 80', Diameter: 1' to 3'
wood: heavy, hard, light brown
bark: smooth, light brown, smooth scales
leaves: simple, shape varies
flowers: April
fruit: acorn

Common name: Common persimmon
Scientific name: *Diospyros virginiana*
Found: dry, open areas, also rich bottom lands.
Identification: size: Height 50 feet, diameter 1 inch
bark: thick, almost square blocks, very dark
leaves: alternate, oval, dark green above, paler beneath, 4 to 6" long
flowers: yellowish, bell shaped
fruit: pulpy, round, orangish, at least an inch in diameter.
wood: hard, strong.
Additional information: Animals and man can eat. Used to make golf club heads.

Common name: Aromatic sumac
Scientific name: *Rhus aromatica*
Other name; Fragrant Sumac
Found: snady soils
Identification: shape: low bush, shrub
leaf: 3-parted, large toothed, nice odor
twig: brown, smooth
flower: small, greenish
fruit: small, red, roundish

b. Plants planted

Last spring a variety of plants were planted on the Rice School site for erosion control. These plants are located about 100 feet south of the entrance to the Plano I. S. D. Learning Center and about 100 feet west of the tree line. The plantings extend almost to Peachtree Lane.

Included are:

Foxglove- *Pentstemon cobea*	15 clumps
Gayfeather-*Liatris*	29 corns
Red gilia- *Ipompsisrubra*	15 clumps
Little bluestem-*schizachyrium*	51 clumps
Texas bluebonnet-*Lupinus texensis*	16 clumps

Seeds:
Blue Flax- *Linum pratense*
Fire wheel- *Gaillardia pulchella*
Sorcey sunflower

In addition, some buffalo grass and more flowers will be planted in the fall. The location will be determined later.

2. Animals

a. Reptile/amphibians

Checklist of reptiles and amphibians which might occur at the Plano I.S.D.Outdoor Learning Center.

The larger reptiles-such as the alligator-are known to occur in this area of Texas, although the chance that any would come up as small a watershed as Rowlett Creek is almost non-existent. In one sunny spot in the Northern section of the western portion of the nature center, a pair of broad headed skinks and a rough green snake were observed. Additional field time at this and other sunny areas in the nature center and along the creek will lead to observation of many of the other reptiles on this list. During the spring mating seasons many of the toads and frogs can be heard and observed during the early dusk hours and on through much of the night. This list is based on Conant (1958), Truett (1972), Calvin (1974), Davis et al. (1974), and Rideout (1975).

REPTILES

SPECIES[a]	HABITAT
CROCODILIANS	
Alligator (*Alligator mississipiensis*)	Rivers, lakes, swamps
TURTLES	
Common snapping turtle (*Chelydra serpentina*)	Permanent fresh water
Alligator snapping turtle (*Macroclemys temmincki*)	lakes, rivers.
Razor-backed musk turtle (*Sternothaerus carinatus*)	Streams, river swamps
Yellow mud turtle (*Kinosternon flavescens*)	Variety of aquatic types
Mississippi map turtle (*Graptemys kohni*)	River swamps
False map turtle (*Graptemys pseudogeographica*)	Lakes, rivers
River cooter (*Chrysemys concinna*)	Ponds, streams, rivers
Red-eared turtle (*Chrysemys scripta*)	Ponds, streams
Ornate box turtle (*Terrapene ornata*)	Upland savannas, pastures
Three-toed box turtle (*Terrapene carolina*)	Upland woods and edges
Mississippi mud turtle (*Kinosternon subrubrum*)	River, swamps

SPECIES[a]	HABITAT
TURTLES (Continued)	
Smooth softshell (*Trionyx muticus*)	Rivers, large streams
Spiny softshell (*Trionyx spiniferus*)	Rivers, lakes
Western chicken turtle (*Deirochelys reticularia*)	Ponds, marshes, ditches
LIZARDS	
Green anole (*Anolis carolinensis*)	Fences, shrubs, vines, trees
Texas spiny lizard (*Sceloporus olivaceus*)	Varous upland types
Eastern fence lizard (*Sceloporus undulatus*)	Various upland types
Texas horned lizard (*Phrynosoma cornutum*)	Open upland areas
Southern prairie skink (*Eumeces septentrionalis*)	Drier vegetated areas
Five-lined skink (*Eumeces fasciatus*)	Damp cutover areas
*Broad-headed skink (*Eumeces laticeps*)	Moist woodlands
Coal skink (*Eumeces anthracinus*)	Moist wooded hillsides
Ground skink (*Scincella laterale*)	Woodland floors
Texas spotted whiptail (*Cnemidophorus gularis*)	Open upland areas
Six-lined racerunner (*Cnemidophorus sexlineatus*)	Open sandy areas
Slender glass lizard (*Ophisaurus attenuatus*)	Dry grasslands or savanna
SNAKES	
Texas blind snake (*Leptotyphlops dulcis*)	Dry soils or prairies
Rough earth snake (*Virginia striatula*)	Subterranean
Smooth earth snake (*Virginia valeriae*)	Abandoned fields
Brown snake (*Storeria dekayi*)	Urban areas
Broad-banded water snake (*Natrix fasciata*)	Most aquatic types
Yellow-bellied water snake (*Natrix erythrogaster*)	Larger permanent waters
Diamond-backed water snake (*Natrix rhombifera*)	Most aquatic types

SPECIES[a]	HABITAT
SNAKES	
Glossy water snake (*Regina rigida*)	Aquatic types
Graham's water snake (*Regina grahami*)	Ponds, streams, sloughs.
Texas garter snake (*Thamnophis sirtalis*)	Various types
Western ribbon snake (*Thamnophis proximus*)	Near aquatic types
Western mud snake (*Farancia abacura*)	Swamps, lowlands
Western hognosed snake (*Heterodon nasicus*)	Dry sandy prairies
Eastern hognosed snake (*Heterodon platyrhinos*)	Sandy areas
Ringneck snake (*Diadophis punctatus*)	Cutover woodlands
Eastern yellow-bellied racer (*Coluber cunstrictor*)	Various types
Eastern coachwhip (*Masticophis flagellum*)	Various types
*Rough green snake (*Opeodrys aestivus*)	Dense woody vegetation
*Texas Rat snake (*Elaphe obsoleta*)	Various types
Great Plains rat snake (*Elaphe guttata*)	Various upland types
Milk Snake (*Lampropeltis triangulum*)	Various types
Prairie kingsnake (*Lampropeltis calligaster*)	Grasslands, savanna
Speckled kingsnake (*Lampropeltis getulus*)	Various types
Flat-headed snake (*Tantilla gracilis*)	Moister habitats
Texas coral snake (*Micrurus fulvius*)	Various types
*Copperhead (*Agkistrodon contortrix*)	Various woodland types
Western cottonmouth (*Agkistrodon piscivorus*)	Lowlands, aquatic areas
Pigmy rattlesnake (*Sistrurus miliarius*)	Near water
Canebrake rattlesnake (*Crotalus horridus*)	Timbered areas
Western diamondback rattlesnake (*Crotalus atrox*)	Various drier types

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[a] Nomenclature follows Thomas (1974)
*Encountered during field investigations

The best single reference for reptiles and amphibians in this area is A Field Guide to the Reptiles and Amphibians of Eastern and Central North America by Roger Conant. This book contains excellent photographs, sketches, and maps. In addition Conant gives a brief but excellent description of field and lab techniques associated with herptiles.

AMPHIBIANS

SPECIES[a]	HABITAT
SALAMANDERS	
Common newt (*Notophthalums viridescens*)	Aquatic types
Small-mouthed salamander (*Ambystoma texanum*)	Moist situations
Tiger salamander (*Ambystoma tigrinum*)	Ponds
Dwarf salamander (*Eurycea quadridigitata*)	Low swampy areas
Lesser siren (*Siren intermedia*)	Aquatic types in water
TOADS AND FROGS	
Eastern spadefoot toad (*Scaphiopus holbrooki*)	Sandy forests
Texas toad (*Bufo speciosus*)	Uplands near water
Gulf Coast toad (*Bufo valliceps*)	Various types
Woodhouse's toad (*Bufo woodhousei*)	Various types
Spring peeper (*Hyla crucifer*)	Woodlands near water
Green treefrog (*Hyla cinerea*)	Aquatic types
Southern gray treefrog (*Hyla chrysoscelis*)	Trees near water
Northern gray treefrog (*Hyla versicolor*)	Tree near water
Eastern narrow-mouthed toad (*Gastrophyryne carolinensis*)	Various moist types
Great plains narrow-mouthed toad (*Gastrophryne olivacea*)	Moist, grassy types

SPECIES[a]	HABITAT
*Cricket frog (*Acris crepitans*)	Small permanent waters
Strecker's chorus frog (*Pseudacris streckeri*)	Various moist types
Upland chorus frog (*Pseudacris triseriata*)	Various moist types
Spotted chorus frog (*Pseudacris clarki*)	Prairies
Southern leopard frog (*Rana sphenocephala*)	Various aquatic types
Southern crawfish frog (*Rana areolata*)	Various aquatic types
Bronze frog (*Rana clamitans*)	Streams, swamps
Pickerel frog (*Rana palustris*)	Cooler aquatic types
Bullfrog (*Rana catesbeiana*)	Lakes, ponds, rivers

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[a] Nomenclature follows Thomas (1974)
*Encountered during field investigations.

The best single reference for reptiles and amphibians in this area is A Field Guide to the Reptiles and Amphibians of Eastern and Central North America by Roger Conant. This book contains excellent photographs, sketches, and maps. In addition Conant gives a brief but excellent description of field and lab techniques associated with herptiles.

b. Fish

Checklist of fishes which may occur in or near the Rowlett Creek system at the Plano ISD Outdoor Learning Center.

This list is based on Conner (Unpublished data).

Lampreys-Family PETROMYZONTIDAE

Southern brook lamprey-*Ichthyomyzon gagei* Hubbs and Trautman

Paddlefish-Family POLYODONTIDAE

Paddlefish-*Polyodon spathula* (Walbaum)

Gars-Family LEPISOSTEIDAE

Spotted gar-*Lepisosteus oculatus* Winchell
Longnose gar-*L. osseus* (Linnaeus)
Alligator gar-*L. spatula* Lacepede

Bowfins-Family AMIIDAE

Bowfin-*Amia calva* Linnaeus

Freshwater eels-Family ANGUILLIDAE

American eel-*Anguilla rostrata* (LeSueur)

Herrings-Family CLUPEIDAE

Skipjack herring- *Alosa chrysochloris* (Rafinesque)
Gizzard shad- *Dorosoma cepedianum* (LeSueur)
Threadfin shad- *D. petenense* (Gunther)

Pikes-Family ESOCIDAE

Grass pickerel-*Esox americanus vermiculatus* LeSueur

Characins-Family CHARACIDAE

Mexican tetra (introduced)-*Astyanax mexicanus* (Filippi)

Minnows and Carps-Family CYPRINIDAE

Stoneroller-*Campostoma anomalum* (Rafinesque)
Goldfish (introduced)- *Carassius auratus* (Linnaeus)
Carp (introduced)-*Cyprinus carpio* Linnaeus
Silvery minnow-*Hybognathus nuchalis* Agassiz
Pallid chub-*H. amnis* (Hubbs and Greene)
Golden shiner- *Notemigonus crysoleucas* (Mitchill)
Emerald shiner- *Notropis atherinoides* Rafinesque
Blackspot shiner-*N. atrocaudalis* Evermann
Ghost shiner- *N. buchanani* Meek
Ribbon shiner- *N. fumeus* Evermann
*Red shiner- *N. lutrensis* (Baird and Girard)
Chub shiner- *N. potteri* Hubbs and Bonham
Silverband shiner- *N. shumardi* (Girard)
Sand shiner- *N. stramineus* (Cope)
Weed shiner- *N. texanus* (Girard)
Redfin shiner- *N. unbratilis* (Girard)
Blacktail shiner- *N.venustus* (Girard)
Mimic shiner- *N. volucellus* (Cope)
Pugnose minnow-*Opsopoeodus emiliae* Hay
Suckermouth minnow- *Phenacobius mirabilis* (Girard)
Flathead minnow- *Pimephales promelas* Rafinesque
Bullhead minnow- *P. vigilax* (Baird and Girard)
Creek minnow- *Semotilus atromaculatus* (Mitchill)

Suckers-Family CATOSTOMIDAE

River Carpsucker- *Carpiodes carpio* (Rafinesque)
Blue sucker- *Cycleptus elongatus* (LeSueur)
Creek Chubsucker- *Erimyzon oblongus* (Mitchill)
Lake Chubsucker- *E. sucetta* (Lacepede)
Smallmouth buffalo- *Ictiobus bubalus* (Rafinesque)
Spotted sucker- *Minytrema melanops* (Refinesque)
Blacktail redhorse- *Moxostoma poecilurum* (Jordan)

Freshwater catfishes-Family ICTALURIDAE

Blue catfish-*Ictalurus furcatus* (LeSueur)
Black bullhead-*I. melas* (Rafinesque)
Yellow bullhead- *I. natalis* (LeSueur)
Channel catfish- *I. punctatus* (Rafinesque)
Tadpole madtom- *Noturus gyrinus* (Mitchill)
Freckled madtom-*N. nocturnus* Jordan and Gilbert
Flathead catfish- *Pylodictis olivaris* (Rafinesque)

Pirate perches-Family APHREDODERIDAE

Pirate perch-_Aphredoderus sayanus_ (Gilliams)

Needlefishes-Family BELONIDAE

Atlantic needlefish-_Strongylura marina_ (Walbaum)

Killifishes-Family CYPRINODONTIDAE

Golden Topminnow- _Fundulus chrysotus_ (Gunther)
Blackstripe topminnow- _F. notatus_ (Rafinesque)
Starhead topminnow- _F. nottii_ (Agassiz)
Blackspotted topminnow- _F. olivaceus_ (Storer)
Rio Grande Killifish- _F. zebrinus_ Jordan and Gilbert

Livebearers-Family POECILIIDAE

Mosquitofish-_Gambusia affinis_ (Baird and Girard)

Silversides-Family ATHERINIDAE

Brook silverside- _Labidesthes sicculus_ (Cope)
Mississippi silverside- _Menidia audens_ Hay
Tidewater silverside- _M. beryllina_ (Cope)

Temperate basses-Family PERCHCHTHYIDAE

White bass- _Morone chrysops_ (Rafinesque)
Yellow bass- _M. mississippiensis_ Jordan and Eigenmann
Striped bass (introduced)- _M. saxatilis_ (Walbaum)

Sunfishes-Family CENTRARCHIDAE

Flier- _Centrarchus macropterus_ (Lacepede)
Warmouth- _Chaenobryttus gulosus_ (Cuvier)
Banded pygmy sunfish-_Elassoma zonatum_ Jordan
Redbreast sunfish (introduced)-_Lepomis auritus_ (Linnaeus)
*Green sunfish-_L.cyanellus_ Rafinesque
Orangespotted sunfish - _L. humilis_ (Girard)
*Bluegill-_L. macrochirus_ Rafinesque
Dollar sunfish- _L. marginatus_ (Holbrook)
Longear sunfish-_L. megalotis_ (Rafinesque)
Redear sunfish- _L. microlophus_ (Gunther)

Sunfishes:

Spotted sunfish-*L. punctatus* (Valenciennes)
Bantam sunfish-*L. symmetricus* Forbes
Spotted bass- *Micropterus punctulatus* (Rafinesque)
Largemouth bass- *M. salmoides* (Lacepede)
White crappie- *Pomoxis annularis* Rafinesque
Black crappie- *P. nigromaculatus* (LeSueur)

Perches-Family PERCIDAE

Scaly sand darter- *Ammocrypta vivax* Hay
Bluntnose darter - *Etheostoma chlorosomum* (Hay)
Slough darter- *E. gracile* (Girard)
Goldstripe darter- *E. parvipinne* Gilbert and Swain
Cypress darter- *E. proeliare* (Hay)
Orangethroat darter- *E. spectabile* (Agassiz)
Bigscale logperch-*Percina macrolepida* Stevenson
Dusky darter-*P. sciera* (Swain)

Drums-Family SCIAENIDAE

Freshwater drum-*Aplodinotus grunniens* Refinesque

Mullets-Family MUGILIDAE

Mountain mullet-*Agonostomus monticola* (Bancroft)
Striped mullet-*Mugil cephalus* Linnaeus

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* Seined from Rowlett Creek April, 1977.

The key to identification of these fish which is easiest to use is How to Know the Freshwater Fishes (2nd ed.) by Samuel Eddy. This book contains an excellent group of 620 illustrations as well as a good bibliography, index, and very useful introductory material.

d. Birds

Checklist of birds likely to occur in the Plano ISD Outdoor Learning Center.

Waterfowl might be seen flying above the area during the appropriate season(s) as indicated. They would probably not land because of limited open water. This list is based on Peterson (1963), Robbins et al. (1966), Truett (1972), Davis et al. (1974), and Brazos Valley Audubon Society (1975). This list excludes birds that simply pass over the area in migration or occur irregularly.

SPECIES[a]	HABITAT	SEASON	GENERAL ABUNDANCE
GREBES			
Pied-billed Grebe	Aquatic	Winter	Uncommon
CORMORANT AND ANHINGA			
Double-crested Cormorant	Aquatic	Winter	Uncommon
Anhinga	Aquatic	Summer	Uncommon
WATERFOWL			
Mallard	Streams, lakes	Winter	Common
Pintail	Streams, lakes	Winter	Common
Gadwall	Ponds, Lakes	Winter	Common
Widgeon	Ponds, lakes	Winter	Common
Shoveler	Ponds, lakes	Winter	Common
Blue-winged Teal	Ponds, lakes	Winter	Common
Green-winged Teal	Ponds, lakes	Winter	Common
Wood Duck	Streams, ponds	Resident	Common
Redhead	Ponds, lakes	Winter	Uncommon
Ring-necked Duck	Ponds, lakes	Winter	Uncommon
Greater Scaup	Ponds, lakes	Winter	Uncommon
Lesser Scaup	Ponds, lakes	Winter	Uncommon
Ruddy Duck	Ponds, lakes	Winter	Uncommon
RAPTORS			
Turkey Vulture	Various habitats	Resident	Common
Black Vulture	Various habitats	Resident	Uncommon

SPECIES[a]	HABITAT	SEASON	GENERAL ABUNDANCE
RAPTORS (Continued)			
Cooper's Hawk	Open Woodlands	Resident	Uncommon
Sharp-shinned Hawk	Open woodlands	Resident	Uncommon
Marsh Hawk	Grasslands	Winter	Common
Red-shouldered Hawk	Woodlands	Resident	Common
Red-tailed Hawk	Savannas, grasslands	Resident	Common
Golden Eagle	Grasslands	Winter	Rare
Bald Eagle	Lakes, rivers	Winter	Rare
Osprey	Aquatic	Winter	Rare
Caracara	Open uplands	Summer	Rare
Peregrine Falcon	Open uplands	Winter	Rare
Pigeon Hawk	Open areas	Winter	Uncommon
Sparrow Hawk	Open areas	Winter	Common
TURKEYS AND QUAIL			
Wild Turkey	Oak forests, savanna	Resident	Uncommon
Bobwhite	Bushy edges	Resident	Common
HERONS AND WADERS			
Common Egret	Aquatic	Resident	Common
Snowy Egret	Aquatic	Summer	Uncommon
Cattle Egret	Pastures	Resident	Common
Great Blue Heron	Aquatic	Resident	Common
Little Blue Heron	Aquatic	Summer	Common
Green Heron	Aquatic	Summer	Common
Black-crowned Night Heron	Aquatic	Summer	Uncommon
Yellow-crowned Night Heron	Streams	Summer	Common
American Bittern	Aquatic	Winter	Uncommon
Least Bittern	Aquatic	Summer	Uncommon
CRANES AND RAILS			
American Coot	Aquatic	Winter	Common
Sora Rail	Marshes	Spring/fall	Uncommon
King Rail	Marshes	Resident	Uncommon
Common Gallinule	Marshes	Summer	Uncommon
SHOREBIRDS			
Killdeer	Pastures	Resident	Common
Spotted Sandpiper	Aquatic	Spring/fall	Uncommon
Solitary Sandpiper	Aquatic	Spring/fall	Uncommon
Greater Yellowlegs	Marshes	Spring/fall	Uncommon
Lesser Yellowlegs	Aquatic	Spring/fall	Uncommon
Common Snipe	Marshes	Winter	Uncommon

SPECIES	HABITAT	SEASON	GENERAL ABUNDANCE
	PIGEONS AND DOVES		
Domestic pigeon	Urban areas	Resident	Common
Mourning Dove	Fields	Resident	Common
	CUCKOOS		
Yellow-billed Cuckoo	Woodlands	Summer	Common
Roadrunner	Brush uplands	Resident	Uncommon
	OWLS		
Screech Owl	Woodlands	Resident	Common
Great Horned Owl	Various types	Resident	Common
Barn Owl	Various types	Resident	Uncommon
Barred Owl	River bottoms	Resident	Common
	GOATSUCKERS		
Chuck-will's Widow	Woodlands	Summer	Uncommon
Whip-poor-will	Woods near fields	Summer	Uncommon
Common Nighthawk	Various types	Summer	Common
	SWIFTS		
Chimney Swift	Various types	Summer	Common
	HUMMINGBIRDS		
Ruby-throated Hummingbird	Various types	Summer	Common
	KINGFISHERS		
Belted Kingfisher	Aquatic	Resident	Common
	WOODPECKERS		
Yellow-shafted Flicker	Savanna	Winter	Common
Pileated Woodpecker	Bottomland woods	Resident	Uncommon
Red-bellied Woodpecker	Woodlands	Resident	Common
Red-headed Woodpecker	Woodland edges, savanna	Resident	Rare
Yellow-bellied Sapsucker	Woodlands	Winter	Uncommon
Hairy Woodpecker	Woodlands	Resident	Common
Downy Woodpecker	Woodlands	Resident	Common

70

SPECIES[a]	HABITAT	SEASON	GENERAL ABUNDANCE
FLYCATCHERS			
Scissor-tailed Flycatcher	Pastures, savanna	Summer	Common
Eastern Kingbird	Pastures, savanna	Summer	Common
Western Kingbird	Pastures, savanna	Summer	Uncommon
Great Crested Flycatcher	Woodlands	Summer	Common
Eastern Phoebe	Various types	Winter	Common
Acadian Flycatcher	Woodlands	Summer	Uncommon
Eastern Wood Peewee	Woodlands	Summer	Uncommon
LARKS			
Horned Lark	Fields	Resident	Uncommon
SWALLOWS			
Tree Swallow	Various types	Spring/fall	Uncommon
Barn Swallow	Open areas	Summer	Common
Bank Swallow	River banks	Summer	Uncommon
Cliff Swallow	Various types	Summer	Common
Rough-winged Swallow	Fields near water	Summer	Uncommon
Purple Martin	Various types	Summer	Common
CROWS, JAYS, AND RAVENS			
Bluejay	Woodlands	Resident	Common
Common Crow	Various types	Resident	Common
CHICKADEES AND TITMICE			
Carolina Chickadee	Woodland brush	Resident	Common
Tufted Titmouse	Woodlands	Resident	Common
CREEPERS			
Brown Creeper	Woodlands	Winter	Uncommon
WRENS			
House Wren	Brush	Winter	Uncommon
Bewick's Wren	Brush	Resident	Uncommon
Carolina Wren	Brush	Resident	Common

SPECIES[a]	HABITAT	SEASON	GENERAL ABUNDANCE
MOCKINGBIRDS AND THRASHERS			
Mockingbird	Woodland edges	Resident	Common
Brown Thrasher	Woodlands	Winter	Uncommon
ROBINS, THRUSHES, AND BLUEBIRDS			
Robin	Various types	Winter	Common
Hermit Thrush	Woodlands	Winter	Common
Eastern Bluebird	Open woodlands	Resident	Common
GNATCATCHERS AND KINGLETS			
Blue-gray Gnatcatcher	Woodlands	Resident	Common
Golden-crowned Kinglet	Woodlands	Winter	Uncommon
Ruby-crowned Kinglet	Woodlands	Winter	Common
PIPITS			
Water Pipit	Fields	Winter	Uncommon
WAXWING			
Cedar Waxwing	Shrubland	Winter	Common
SHRIKES			
Loggerhead Shrike	Savanna	Resident	Uncommon
STARLINGS			
Starling	Various types	Resident	Abundant
VIREOS			
Solitary Vireo	Forests	Winter	Uncommon
White-eyed Vireo	Thickets	Summer	Uncommon
Yellow-throated Vireo	Forests	Summer	Uncommon
Red-eyed Vireo	Forests	Summer	Uncommon

SPECIES[a]	HABITAT	SEASON	GENERAL ABUNDANCE
WARBLERS			
Black-and-white Warbler	Woodlands	Summer	Uncommon
Prothonotary Warbler	Woodland-streams	Summer	Uncommon
Orange-crowned Warbler	Forests	Winter	Uncommon
Yellow Warbler	Thickets	Summer	Uncommon
Myrtle Warbler	Woodlands	Winter	Abundant
Yellow-rumped Warbler	Forests	Winter	Common
Prairie Warbler	Deciduous samplings	Spring/fall	Uncommon
Pine Warbler	Pine forests	Winter	Uncommon
Yellowthroat Warbler	Brush	Summer	Uncommon
Yellow-breasted Chat	Thickets	Summer	Uncommon
Kentucky Warbler	Woodland	Summer	Common
WEAVER FINCHES			
House Sparrow	Urban areas	Resident	Abundant
MEADOWLARKS			
Eastern Meadowlark	Grasslands	Resident	Abundant
Western Meadowlark	Grasslands	Resident	Common
GROSBEAKS, FINCHES, SPARROWS, AND BUNTINGS			
Vesper Sparrow	Meadows	Winter	Common
Lark Sparrow	Shortgrass	Resident	Common
Slate-colored Junco	Brushy clearings	Winter	Uncommon
Chipping Sparrow	Savanna	Winter	Uncommon
Field Sparrow	Oldfields	Winter	Common
Harris Sparrow	Brush	Winter	Uncommon
White-crowned Sparrow	Thickets	Winter	Common
White-throated Sparrow	Underbrush	Winter	Common
Fox Sparrow	Thickets	Winter	Uncommon
Lincoln's Sparrow	Streamside thickets	Winter	Uncommon
Swamp Sparrow	Marshes	Winter	Uncommon
Song Sparrow	Brush	Winter	Uncommon
McCown's Longspur	Grasslands	Winter	Uncommon
Chestnut-collared Longspur	Grasslands	Winter	Uncommon

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[a] Nomenclature follows American Ornithologists' Union (1957 and 1973)

The single best reference for field identification of these birds is A Guide to Field Identification: Birds of North America by C. S. Robbins, Bertel Brunn, and Herbert S. Zim. This book contains excellent pictures of the birds with descriptions and distribution maps on the page opposite the picture. A hardbound copy is recommended if extensive use of the book in the field is anticipated.

d. Mammals

Checklist of mammals which may occur in the Plano I.S.D. Outdoor Learning Center.

Large mammals-such as the white-tailed deer-are not likely because of the limited area. If some of the surrounding area is left as it is there is the possibility that small rodents may become more abundant. In 50 trap nights no rodents were caught. There was distinct evidence that some slightly larger mammals-perhaps raccoons or opossums-had tampered with the traps. Additional trapping by a junior or senior high school field ecology class would undoubtedly yield more information. This checklist is based on Davis (1966), Truett(1972), Davis et al. (1974), and Rideout (1975).

SPECIES[a]	HABITAT	GENERAL ABUNDANCE
	MARSUPIALS	
Opossum *Didelfphis virginiana*	Various types	Common
	INSECTIVORES	
Eastern mole *Scalopus aquaticus*	Moist sandy soils	Common
Short-tailed shrew *Blarina brevicauda*	Forests and meadows	Common
Little short-tailed shrew *Cryptotis parva*	Grasslands	Common
	BATS	
Georgia bat *Pipistrellus subflavus*	Waterways,pastures	Unknown
Big brown bat *Eptesicus fuscus*	forests	Unknown
Red bat *Lasiurus borealis*	Various types	Unknown
Evening bat *Nycticeius humeralis*	Forests, waterways	Unknown

SPECIES[a]	HABITAT	GENERAL ABUNDANCE
	CARNIVORES	
Raccoon *Procyon lotor*	Various types	Common
Ringtail *Bassariscus astutus*	Rocky areas, woodlands	Uncommon
Long-tailed weasel *Mustela frenata*	Various types	Uncommon
Mink *Mustela vison*	Waterways	Uncommon
River otter *Lontra canadensis*	Lakes, rivers	Rare
Spotted skunk *Spilogale putorius*	Woodlands, prairies	Uncommon
Striped skunk *Mephitis mephitis*	Woodland edges	Common
Red fox *Vulpes vulpes*	Various types	Uncommon
Gray fox *Urocyon cinereoargenteus*	Mixed hardwood forests	Uncommon
Coyote *Canis latrans*	Various types	Common
Bobcat *Lynx rufus*	Various types	Uncommon
	RODENTS	
Eastern gray squirrel *Sciurus carolinensis*	Deciduous woodlands	Common
Fox squirrel *Sciurus niger*	Oak-hickory woodlands	Common
Eastern flying squirrel *Glaucomys volans*	Forests	Common
Plains pocket gopher *Geomys bursarius*	Sandy soils	Common
Hispid pocket mouse *Perognathus hispidus*	Sandy oldfields	Common
Beaver *Castor canadensis*	Waterways, lakes	Common
Long-tailed harvest mouse *Reithrodontomys fulvescens*	Woodlands	Common

SPECIES	HABITAT	GENERAL ABUNDANCE
RODENTS (Continued)		
White-footed mouse *Peromyscus leucopus*	Woodlands	Common
Cotton mouse *Peromyscus gossypinus*	Riparian woodlands	Uncommon
Hispid cotton rat *Sigmodon hispidus*	Grasslands, oldfields	Abundant
Florida Woodrat *Neotoma floridana*	Various woodlands	Common
House mouse *Mus musculus*	Urban areas	Common
Roof rat *Rattus rattus*	Urban areas	Common
Norway rat *Rattus norvegicus*	Urban areas	Uncommon
Nutria *Myocastor coypus*	Waterways, lakes	Common
HARES AND RABBITS		
Eastern cottontail *Sylvilagus floridanus*	Brushy edges	Abundant
Swamp rabbit *Sylvilagus aquaticus*	Riparian woodlands	Common
CLOVEN-HOOVED MAMMALS		
White-tailed deer *Odocoileus virginianus*	Subclimax woodlands, edges	Common
ARMADILLOS		
*Nine-banded armadillo	Various types, diggable soils	Common

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[a] Nomeclature follows Jones et al. (1973)

The Mammals of Texas by William B. Davis is the best and most readable field guide available. It includes many photographs and maps.

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[1] From "Environmental Assessment of the Plano ISD Outdoor Learning Center" prepared by Dan L. Wilkinson and Ray Quinn for Plano ISD June, 1977.

3. Other

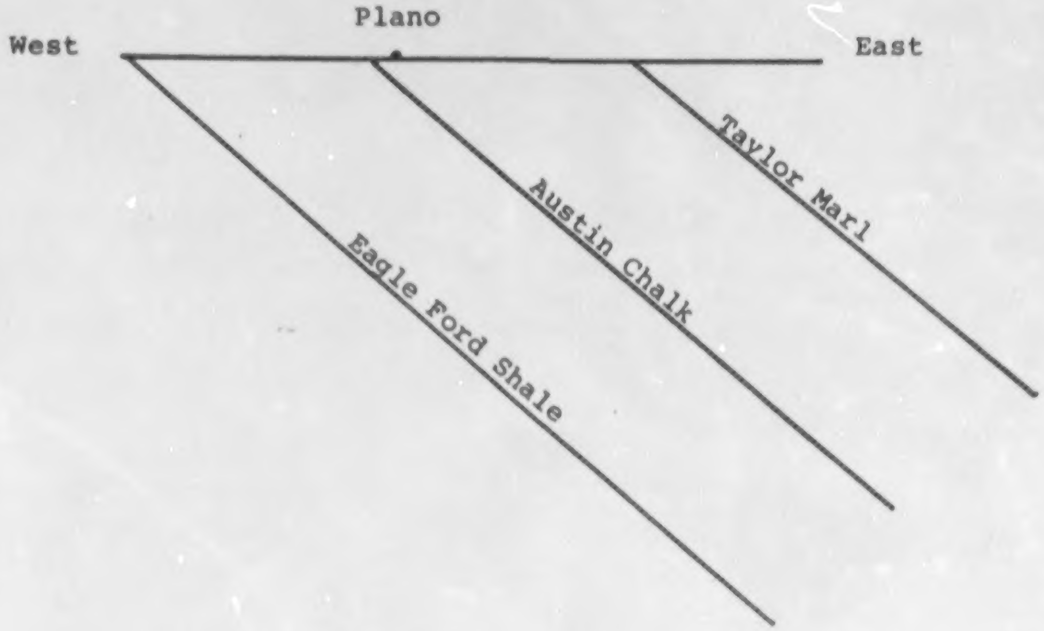
a. Geology

To refresh your memory, here is the geological time chart.

ERA	PERIOD	EPOCH	AGE (In millions of years)
Cenozoic	Quaternary	Holocene	
		Pleistocene	2-3
	Tertiary	Pliocene	12
		Miocene	26
		Oligocene	37-38
		Eocene	53-54
		Paleocene	65
Mesozoic	Cretaceous		136
	Jurassic		190-195
	Triassic		225
PALEOZOIC	Permian		280
	Pennsylvanian		
	Mississippian		345
	Devonian		395
	Silurian		430-440
	Ordovician		500
	Cambrian		570
PRECAMBRIAN			3,600

GEOLOGICAL TIME CHART (based on time divisions used by the U.S. Geological Survey)

During the upper cretaceous period, three major formations occured in Collin County.


Plano
West
East
Taylor Marl
Austin Chalk
Eagle Ford Shale

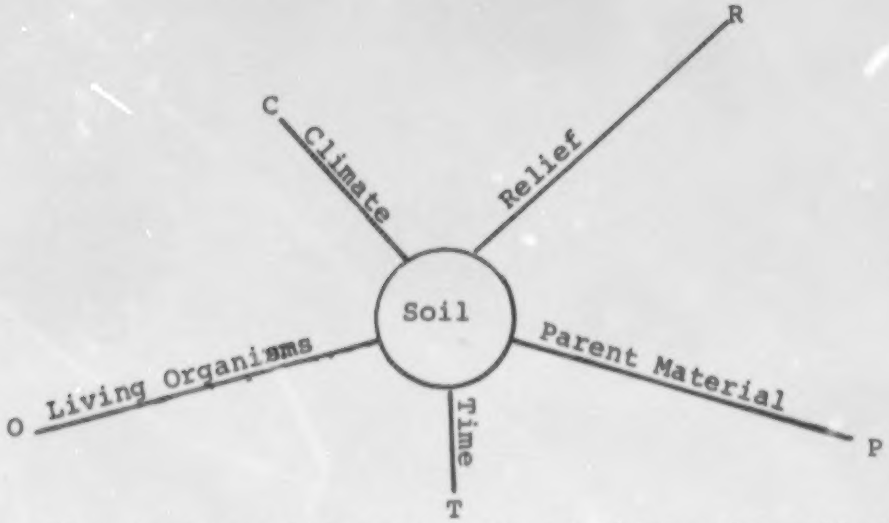
Look at this simplified columnar section for Collin County.

Cenozoic	Quarternary	
		Alluvium--mostly along streams. Thickness varies.
Mesozoic	Upper cretaceous	Taylor--marl, calcareous shale and clay
		Austin--chalk and marl
		Bagle Ford--mostly bituminous shale-underlies all Collin county.

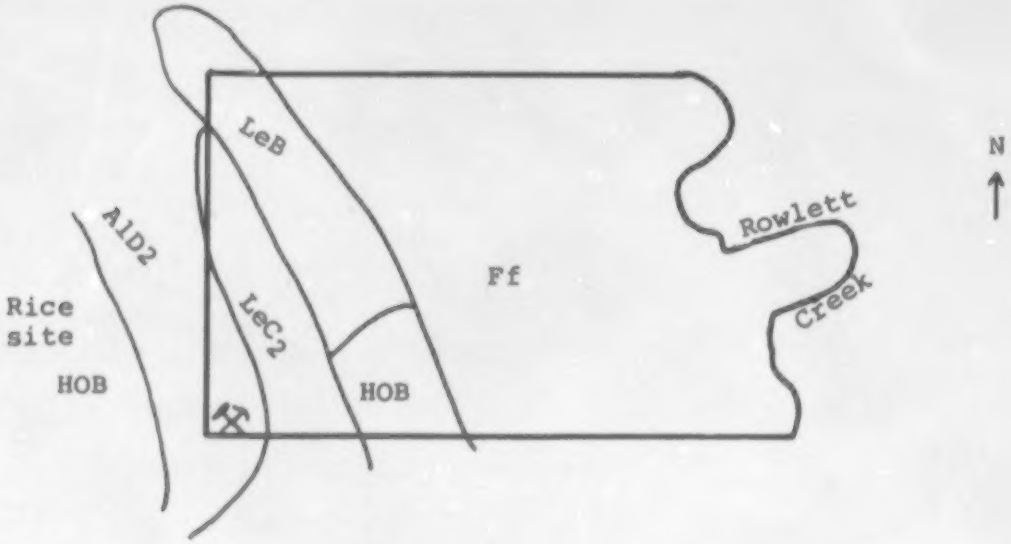
Very few rocks are found at the Plano I.S.D. Outdoor Learning Center. Most of these are small pebbles in the creek. Looking at the columnar section and Second Chart, you will see that Plano is sitting on some sedimentary rocks. It is quite likely that a student might bring a sample of one of these rocks, chalk for example, to class.

Knowing a little about the geology of the area and the rock types, it is no surprise that fossils will be found in many creeks. At this point a few fossil shells have been found at the Plano I.S.D. Outdoor Learning Center, which seems consistent with the idea of the sediments being deposited by a huge, prehistoric sea. As more groups visit the center, no doubt more fossils will be found and a more complete listing will be available.

(Soil is the result of 5 major factors.)


Soil
C
Climate
R
Relief
O
Living Organisms
T
Time
P
Parent Material

As these five factors will vary place to place, the soil will vary accordingly. Our soils at the Plano ISD Outdoor Learning Center are no exception. Below is a map of the center and the soils in it.


LeB
AlD2
Rice site
HOB
LeC2
HOB
Ff
Rowlett
Creek
N

b. Soil

SYMBOL	NAME
A_1D_2	Altoga silty clay, 5 to 8% slopes, eroded
Ff	Frio clay loam, frequently flooded.
HoB	Houston Black clay, 1 to 3% slopes.
LeB	Lewisville silty clay, 1 to 3% slopes
LeC2	Lewisville silty clay, 3 to 5% slopes, eroded
⚒	Mines and Quarries.

Students may not be aware that more than one soil type can occupy such a small area. They may quite simply view it all as "dirt". Should they become more interested, they might like to know that Plano has two major soil associations: Houston Black-Austin association and Trinity-Frio association. Basically, this association of Houston Black occurs gently sloping to sloping on uplands. These are clay soils that are deep over marl and chalk. The Trinity-Frio is deep, rather level clay and loamy. It is found on flood plains like Rowlett Creek.

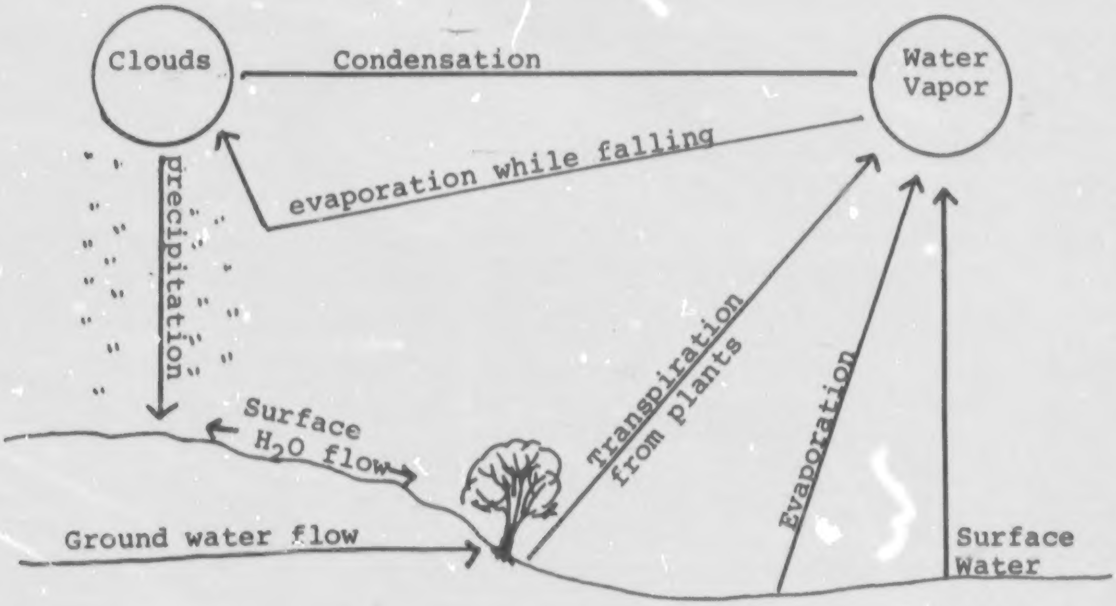
For more detailed information on soil types consult the Soil Survey of Collin County, Texas issued by the USDA Soil Conservation Service. The survey is a wealth of material on use and management of soils. It tells how they are formed and classified. The survey gives a well-rounded picture of the area. In all, it is a good tool to use in understanding the various facets of the environment as found in Plano and Collin County.

c. Watershed

It seems inevitable that questions will come up. Where does the water come from? Where does the rain go that hits the ground?

Look at a map including Collin County, follow Rowlett Creek north and west to it's headwaters. The creek goes almost as far west as Frisco and about as far north as U.S. 380. Following the creek south, it flows into Lake Ray Hubbard. Tracing the water after it leaves the lake could also be interesting.

Analyzing where rain goes is aided by looking at the hydrological cycle. Plano averages about 40" of rain a year.


Clouds
Condensation
Water Vapor
evaporation while falling
precipitation
Surface H_2O flow
Transpiration from plants
Evaporation
Ground water flow
Surface Water

The cycle does not include uses of water and input of water by man. Adding the effects of man could stimulate additional questions.

If additional questions arise on mans' effect on water supply and quality, the answers might be found by going to (or at least calling) local facilities. Our drinking water comes from Lake Lavon. Our waste water (sewage) is treated at a plant further down Rowlett Creek that is south of Los Rios, but north of FM 544.

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OUTLINE TO SECTION III

III. CORRELATING MATERIAL

Communication is the purpose of this section. To keep the environmental studies a dynamic and important part of the curriculum, it is important to continually update it and share findings with everyone. The flow of ideas is equally important both ways: to the teacher and from the teacher.

A. Quarterly bulletins from Curriculum

B. Curriculum

    1. Goals
    2. Copy of grade level curriculum

C. Teaching idea sources

    1. Pre- and post site activities
    2. Ideas from other districts
    3. Articles from the media
    4. Films and books available

D. Feedback (from classroom to curriculum)

    1. Improvement

        a. site
        b. program

    2. Running inventory

        a. plant
        b. animal

    3. Good activities to share with teachers (class or site)

A. Quarterly Bulletins from Curriculum.

(Please file all correspondence here.)

B. Curriculum

   1. Goals

   2. Grade Level Curriculum

GOALS FOR ENVIRONMENTAL EDUCATION K-12

I. To provide the student with a broad understanding of, and an appreciation for, the environment, both natural and man-made.

II. To understand that man is an integral part of the environmental system and that he has the ability to alter the interrelationships of the system.

III. To gain an awareness of fundamental understanding of environmental problems, how these problems might be solved, and the need to cooperate in their solutions.

IV. To encourage students to develop a personal involvement to the extent that they will possess an environmental ethic which will guide their behavior.

V. To provide a setting, in addition to the regular classroom, to enhance student-teacher relationships.

VI. To integrate the learning activities for environmental education into all the disciplines, but with primary emphasis in science education.

VII. To improve the basic language arts and arithmetic skills by providing experiences that allow for the application of these skills in the natural environment.

KEY CONCEPTS Stewardship

CONTENT AREA Science

GRADE LEVEL K

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Develop interest, appreciation and responsibility for animal life. (6)	CLASSROOM: I. A. Have a pet in the classroom and children will be responsible for it's care. B. Have children bring in pets that are unusual and discuss their needs. CAMPUS: I. A. Bug's Eye View. Go outside. Everyone stretches out eyes on grass level, to see what the world is like to a bug. The blade of grass is like a tree! The pebble is mountain size to a bug. Big things like trees just don't show. People are just feet. (Taken from: Learning about Nature Through Games By: V. Musselmen.) B. Flight Watch Go with youngsters to a quiet place, sit quietly. and watch the flight of birds. Try to see birds that: soar like gliders flap their wings steadily fly up and down in short curves make very short flights fly very high fly very low sing, whistle or make other sounds in flight Do birds take off or land against the wind, or with the wind? Can a bird fly backwards? Why don't birds fall off their perches on their back when they're asleep? Look at a pet canary or parakeet and find out.	Care of Pets (2nd Ed) Color. 13 min. (EBF) BAV10344 Filmstrips: How Animals are Alike What Animals Need Veternarian visit classroom.

KEY CONCEPTS Stewardship

CONTENT AREA Science

GRADE LEVEL K

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: I. A. Take a walk and look for animals and their homes. Talk about the things animals need for survival. Poem: Taking a walk was so much fun We didn't hurry, we didn't run. We watched for birds and watched for bees. We looked at all the pretty budding trees. (From Project I-C-E Environmental Education Guide)	

KEY CONCEPTS Stewardship

GRADE LEVEL K

CONTENT AREA Science

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. Discuss basic needs for animal life (food, shelter, water) (4)	CLASSROOM: 2. A. Have several small pets in the classroom. Compare the needs of each pet, what kinds of food, amounts of food, shelter, etc. CAMPUS: 2. A. Make a bird feeder and watch birds feed. See how many birds the children can identify. SITE: 2. A. Discuss "Hibernation" and talk about how different animals prepare for winter.	The Ant and the Grasshopper. Small. Care and Feeding Animals. Holt Gerbils and Other Small Pets. by Shuttlesworth Dutton.

KEY CONCEPTS Stewardship

CONTENT AREA Science

GRADE LEVEL K

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. Recognize common animals by sight and sound. (6)	CLASSROOM: 3. A. Teach the children that reptiles are not all repulsive and dangerous. However they should be taught to respect all reptiles and avoid picking them up. Teach them that many reptiles are not only harmless, but actually helpful. They get rid of many insect pests. B. Have clay or Play-Doh available so children can model any animal they choose. C. Game, "What Animal Am I?" Have pictures of different animals in a box. Let the children take turns taking a picture from the box. Do not let anyone else see the picture. Ask each child to impersonate that animal. How he should act? What sound he should make? Let children take turns impersonating the pictures. If the other children identify the animal, the child may keep the picture. If no one is able to identify the animal being impersonated, the picture is put back in the box and used again. D. Fingerplays on Animals I'm a little turtle; I crawl oh so slow; (crawl slowly on hands and feet) I carry my house wherever I go. (Look over shoulder at "house" on back.) When I get tired, I pull in my head, (put head down between arms.) My legs, and my tail, and I go to bed! (Crouch with body hunched over arms and legs.) (From Teaching With Rhythmic Activities by David C. Cook Publishing Co. Elgen, Ill.)	

KEY CONCEPTS Stewardship

CONTENT AREA Science

GRADE LEVEL K

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ENRICHMENT ACTIVITY: Obtain a used bird's nest. Let the children examine it. Determine the materials used in making the nest. Try to determine what kind of bird made the nest.	

KEY CONCEPTS Pollution

CONTENT AREA Science

GRADE LEVEL K

UNIT Man and His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Discuss ways the student can help prevent pollution (2,3,4,5,6)	CLASSROOM: 1. A. Litter Collage **Objective:** To increase awareness of how we, as individuals, contribute to the litter problem. **Materials:** litter collected in Activity 1. glue or pins tagboard or bulletin board **Procedure:** Let children arrange on tagboard or bulletin board, litter collected on walk. B. Litter Bag **Objective:** To learn a new way to help prevent litter. **Materials:** paper sack crayons - glue construction paper scraps **Procedure:** Discuss how important each child is in preventing litter. In the art center, let each child make a litter bag and then take it home to be used in their car. C. Water Pollution **Objectives:** To show how water becomes polluted **Materials:** test tube holder glass or plastic cigar tubes different types of water. **Procedure:** Put different types of water in each tube. Show the differences between clear and polluted water. Alternate Activity: To show further effects of pollution, you could use the polluted water on plants and observe the results.	**Books:** Bartlett, Margaret F. **The Clear Brook**. Thomas Crowell. **Films from Region X:** MP 1636 **Litter, Litter Everywhere**. MP 1714 **I Like Water**. Write to: 1. Environmental Protection Agnecy: Office of Public Affairs 1 North Wacker Drive Chicago, Illinois 60606 Ask for free booklet: **Needed: Clean Water Problems of Pollution** 2. U. S. Environmental Protection Agency Region VII Kansas City, Missouri Ask for coloring book: **The Adventures of Walter Waterdrop**.

KEY CONCEPTS Pollution

CONTENT AREA Science

GRADE LEVEL K

UNIT Man and His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	D. Make bulletin board from pictures showing: 1. Polluted water 2. Clean water 3. People fishing in a lake 4. Water recreation E. Children will talk about reasons why people and animals need clear water. Make a chart on ways to keep lakes and streams clean: 1. Don't throw trash out of your car. 2. When picnicing in a park be sure to put litter in trash cans. 3. Remind parents and friends not to throw trash in streams. 4. Why do fish die in polluted water? Because the plant life in the water can't replace the dissolved oxygen as rapidly as it is used up.	

KEY CONCEPTS Pollution

CONTENT AREA Science

GRADE LEVEL K

UNIT Man and His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: 1. A. Go out on the campus and collect litter. SITE: 1. A. Litter Awareness Walk Objectives: To become aware of different kinds of litter in our own surroundings. Materials: None Procedure: Discuss the purpose of the walk and, upon return, write experience story. While on walk have children pick up litter to be used for Activity 2. B. Look at creek bed for evidence of pollution--littering, trash, etc.	

KEY CONCEPTS Pollution

CONTENT AREA Science

GRADE LEVEL K

UNIT Man and His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	FINGERPLAY: AIR What do I breathe to keep me alive? (Take a deep breath) What do bees fly in to reach their hive? (Make circular motion with limp fingers.) What do I blow in a sailboat race? (Blow out large breath.) What do I move to fan my face? (Pretend to fan face) And all about me, what is to be found? (Put hands to sides & turn completely around) Why it's nothing but air all around! (Stand up, move arms in large circle)	Write to: IEE Offices Nova High School, 3600 S. W. College Ave. Fort Lauderdale, Florida 33314 Ask for-- Little Johnny Raindrop A poem of the water cycle.

KEY CONCEPTS Pollution

GRADE LEVEL K

CONTENT AREA Science

UNIT Man and His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ACTIVITY: Make a chart of things that pollute our air and water (paper, cars, trucks, cans, factories, homes, planes, garbage, rubbish). Children will look through old magazines for pictures to paste on the chart. Read a story to the children outside. Before going outside discuss the kind of place we would like to have to read our story - a quiet place, free of litter, a tree etc.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Observe the parts of a plant. (Ex. stem, roots, leaves, blossom) (2)	CLASSROOM: I. A. Plant Cuttings **Objectives:** To see which plant cuttings will root to make new plants. **Materials:** Cuttings from a variety of plants. **Procedure:** Cut stems from plants and take off some of the lower leaves. Cut off excess stem just below first node and place in container of water. Observe how root develops from first node. B. Avocado Seed **Objectives:** To observe growth in parts of the plants. **Materials:** Avocado Seed Glass or jar. Toothpicks **Procedure:** Wash seed in tepid water. Drive three toothpicks into seed and suspend (broad end down) over jar covering about 1/2" of seed with water. Place in warm spot out of direct sunlight. It takes two to six weeks to root. When stem reaches 7 inches, cut stem in half so plant will bush out. Once roots are thick and stem has leafed out, carefully plant in potting soil leaving seed half exposed.	The True Book of Weeds and Wild Flowers. by Illa Porlendorf. Children's Press, 1961.

KEY CONCEPTS Functions of Plants

GRADE LEVEL K

CONTENT AREA Science

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

C. Citrus Fruit Seeds

Objectives: To promote interest in growing plants.

Materials: Grapefruit, lemon or orange seeds (be sure to use seeds from fully developed fruits)
container
potting soil

Procedure: Plant seeds in soil about 1/4" - 1/2" deep and keep moist. It takes a while for them to sprout.

D. Carrot Top

Objectives: To promote interst in growing plants

Materials: 1" carrot tops
a not too deep dish
perlite, vermiculite, or sand

Procedure: Place carrot in soil with top exposed. Keep quite moist and place in somewhat shaded spot. In about a weeks time the dormant leaf buds come alive and up comes the foilage.

CAMPUS:

1. A. Take a walk and observe different types of plants and their parts.
   B. Observe the parts of a plant by planting a garden (radishes, pumpkins, flower seeds etc.)

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 1. A. Take a walk to observe different types of plant life and to identify the parts of a plant. B. Go for a walk and let the children find leaves and stems of other plants. Pull up some weeds so the children can examine the roots.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. Discuss things a plant needs for growth. (1,4).	CLASSROOM: 2. A. Objectives: To determine which type of soil is best for growing plants. Materials: Seeds for planting. container with sand. container with small rocks. container with rich black dirt. Procedure: The children plant the same kind of seeds in each of the three types of soil. During the growth period each plant gets the same amount of water and sunshine. Compare growth of the plants. B. Lima Beans Objective: To observe things necessary for plant growth. Materials: Seeds from lima beans. plastic bag paper toweling pot of dirt Procedure: Place a little water in the bottom of plastic bag. Put seeds in top of bag with paper toweling to hold them in place and tack to bulletin board. Observe seeds germinating. Note the roots, stem, and leaves. Observe how these plants die due to lack of air. Now plant several seeds in a pot of dirt. Children can measure growth by cutting strips of construction paper the same size of plant and pasting on a chart.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	C. Travel Through a Stem Objective: To show how plants take up water through their stems. Materials: Celery sticks 2 glasses food coloring Procedure: Place celery stalks in colored water. Within a few days the children can see how the celery has absorbed the colored water. CAMPUS: 2. A. The children will plant the same kinds of seeds. Some will receive sunshine but no water. Some will receive water but no sunshine. Compare growth of the plants. SITE: 2. A. Take a walk and observe the growth of plants in dense forest as compared to growth of plants in clearings.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM: 2. D. Put a plant in the window. Observe how its leaves will turn toward the sunlight. Turn the plant and observe how the leaves will again turn toward the sunlight. E. Terrarium Objective: To study plant environment. Materials: Large wide mouthed jar or aquarium coarse gravel or sand charcoal moss and plants piece of glass to cover the terrarium (tape edges for safety) Procedure: Cover the bottom of the container with coarse gravel or sand and bury charcoal in it to absorb gases and to keep the soil from becoming sour. Then add rich soil and put in the plants. Cover the remaining soil with moss. Sprinkle water over the top of plants. Cover the terrarium with a piece of glass. Alternate Activity: You may bury a small pan in one end as a pond which will provide the necessary moisture. Place animals you have selected in terrarium and put on glass top. Feed animals sparingly and remove uneaten food or it will decay.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. Discuss ways in which new plants begin (ex. seeds, cuttings, etc) (2,3)	CLASSROOM: 3. A. Compare seeds of different plants. Procedure: Collect different types of seeds to compare sizes, shapes, colors, etc. B. Rooting of Plant cuttings. Materials: Cuttings from different types of plants (airplane plant, wandering jew, ivy, etc.) Procedure: Put cuttings in water and let the roots form. Discuss appearance of the roots and how they differ. CAMPUS: 3. A. Plants Grow sunflowers outdoors. Let the children observe them at various times of the day so they can see how they follow the sun.	

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To become aware of common Texas plants. (Ex. bluebonnet, pecan, etc.) (6)	CLASSROOM: 4. A. Show pictures and discuss state flower (bluebonnet) and state tree (pecan) and other common Texas plants. CAMPUS: 4. A. Identify plants on school campus (oak trees, redbud trees, etc.) B. Plant some bluebonnet seeds and watch them grow. SITE: 4. A. Identify some common Texas plants. (Ex. bluebonnets, pecans, etc.)	Books: Bulla. A Tree is a Plant. Thomas Crowell Co. Jordan. How a Seed Grows. Thomas Crowell Co. Podendorf. The True Book of Weeds and Wildflowers. Childrens Press, Inc. Selsam. Seeds and More Seeds. Harper and Row. Peterson. Tulips. Holt. Kuskin. The Bear Who Saw Spring. Harper. Krauss. The Carrot Seed. Films from Region X. MP 1363 Tree on the Road to Turntown. MP 1063 We Explore the Field and Meadow. MP 4289 What Plants Need for Growth. MP 1708 I Like Trees.

KEY CONCEPTS Functions of Plants

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ENRICHMENT ACTIVITIES: Activity: Make a nature table. Let the children gather the materials to go on it such as leaves, acorns, pine cones, etc. Take a trip to a nearby vacant lot. Let the children see how many different plants they can find. Bring some weeds or wildflowers to class that grow in our area. Using a book with pictures of wild flowers, let the children try to identify them. Visit the produce dept. of a grocery store. Ask the manager to explain where he gets the vegetables and how he packages them. Make a chart of various vegetables, showing which part of the plant is eaten. Help the children make a chart showing the parts of a plant - roots, stems, leaves.	

KEY CONCEPTS Functions of Plants.

CONTENT AREA Science

GRADE LEVEL K

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

SUPPLEMENTARY ACTIVITIES:

Fingerplays for Plants:

Flower Garden

I work in my garden,
Plant seeds in a row,
The rain and sunshine,
Will help it grow.
Sometimes when the weather
Is too dry and hot,
I sprinkle the earth
With my watering pot.
The roots pushing downward
The stem pushing up.
My blossoms have opened,
Rose and pink buttercups.

Little Seeds

Once I was a little seed planted in the ground
(Crouch down and be a seed)
The sun shone down to warm me up and I begin to grow
(slowly rise)
Each day I grew a little bit til I could see the sun
(raise head)
And then some little leaves come out
(raise arms)
Oh this is lots of fun.
And still I'm growing tall you see
(Keep getting taller)

KEY CONCEPTS ______________________ CONTENT AREA ______________________

GRADE LEVEL ______________________ UNIT ______________________

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

Little Seeds (cont. . .)

Now there are leaves all over me.
(spread fingers)
Oh, now I know what I must be
(point to self)
I've turned into a tree!
(stand straight on toes, arms high)

Little Seeds

I put some little flower seeds
(pretend to hold a seed between your thumb and index finger)
Down in the warm soft ground,
(stoop down & pretend to plant seeds)
I sprinkled them with water
(pretend to water ground)
From a sprinkling can I found
(hold up pretend watering can)
The big, round sun shone brightly
(make large circle with hands above your head)
We had some soft rain showers
(flutter fingers downward)
The little seeds begin to grow
(Stoop down, get up slowly)
Soon I had lovely flowers
(spread hands outward and smile)

KEY CONCEPTS Functions of Plants
CONTENT AREA Science
GRADE LEVEL K
UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

Five Little Flowers

Five little flowers standing in the sun
(hold up hands)
See their heads nodding, bowing one by one
(bend fingers down toward palm)
Down, down, down comes the gentle rain
(both hands)
Five little flowers raise their heads again.

Plants: Career Education

To bring the idea of careers into the study of plants the following is a list of possible resource persons:

- florist
- farmer
- nurseryman
- mothers interested in plants
- gardener

KEY CONCEPTS Adaptation

CONTENT AREA Science

GRADE LEVEL K

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. The student will observe changes in weather from day to day, and from season to season. (1,5)	CLASSROOM: 1. A. Calendar Objective: To observe the daily changes in weather. Materials: Calendar symbols representing various weather conditions. Procedure: Discuss what weather is like today. Let "calendar helper" pin appropriate symbol on calendar. (This activity could be used on an individual basis with each child having his own calendar.) B. The Thermometer Objective: To study the thermometer and how it operates. Materials: 9" x 12" piece of cardboard 2 strips of 1" construction paper 1 red and 1 white Procedure: Draw a large thermometer on the cardboard. Cut a slit at the top and bottom. Cut strips of red and white paper and paste together to form one long strip. Pull long strip through slits at top and bottom of the thermometer with red part at the bottom. To work pull the strip up for hot and down for cold. C. Force of Wind Objective: To discover the force of the wind. Materials: colored streamers Procedure: Give each child a piece of paper on a windy day. Take the class outside and let them discover the force	Johnny Maple Leaf. Seeds by John Burmingham. The Snowy Day - John Keats The Big Snow by Berta and Elmer Hader, Macmillan 1948. White Snow, Bright Snow by Alvin Tresselt Lorthrop

KEY CONCEPTS Adaptation

CONTENT AREA Science

GRADE LEVEL K

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	and push of wind by placing the paper against their bodies and observing that the wind holds it there. D. Making Rain Objective: To show how rain is made. Materials: Tea kettle ice cubes pie pan water Procedure: Boil the water in the tea kettle. A "cloud" will form just beyond the spout. Hold the pie pan with the ice cubes in the "cloud" area. Watch the rain form. E. Air from Water Objective: To show the air has water in it that you cannot see. Materials: jar and lid ice Procedure: Take a jar that is very dry on the outside. Fill it with ice then put lid on. Soon you will see little drops of water on the jar. Where do they come from? From inside the jar? No. They come from the air outside. The air has water in it that you cannot see. This water turns into drops when the air around the jar cools quickly.	

KEY CONCEPTS Adaptation
CONTENT AREA Science
GRADE LEVEL K
UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	H. Fingerplay "Puddles" I like to walk through puddles (Step as in water) When the rain goes drippy-drip. (Flutter fingers downward) I like to jump in puddles. (Jump about) And I don't get wet a bit! (Shake head) You see, I put on rain boots (Point to feet) A raincoat and a hat; (point to clothing and head) Then I can jump in puddles. (jump) Now, what do you think of that? (Shake pointer finger) I. Let children draw posters showing clothes for each season.	

KEY CONCEPTS Adaptation

GRADE LEVEL K

CONTENT AREA Science

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	F. Which Dries Faster Objective: Water evaporates faster when air is moving. Materials: Cardboard water pleated paper fan Procedure: Moisten two areas of a cardboard. Fan one, let other dry naturally. G. Making a Cloud Objective: To show how warm air and cold air meet to make a cloud. Material: Milk bottle crushed ice hot water string thin cloth Procedure: Pour the hot water into the milk bottle. When the bottle becomes hot pour out all but one inch of water. Stretch the cloth over the mouth of the bottle. Put the crushed ice on this and fasten cloth and ice in place. A cloud is formed when the warm air meets the cold.	

KEY CONCEPTS Adaptation
GRADE LEVEL K
CONTENT AREA Science
UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

SUPPLEMENTARY ACTIVITIES:

Wind Tricks

The wind is full of tricks today---
He blew my daddy's hat away.
He chased our paper down the street.
He gives scraps either wings or feet.
He makes the trees and bushes dance.
Just listen to him howl and prance.

Autumn Leaves

Let us be an autumn leaf.
We twirl and twirl around
We twist and turn and twirl again,
And tumble to the ground.

Leaves

The leaves are dropping from the trees
(Flutter fingers up in air and to ground)
Yellow, brown, and red.
They patter softly like the rain,
(Tap fingers on floor)
One landed on my head.
(Tap head)

Winter

See the snowflakes - feathery and white,
(Gently flutter fingers downward.)

KEY CONCEPTS Adaptation

GRADE LEVEL K

CONTENT AREA Science

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: I. A. Choose one tree to watch during the year. Observe the tree in the summer, fall, winter and spring. Draw, paint or sponge paint the tree as it appears each season. B. Compare outside temperature changes and watch the thermometer for several days. C. Take children outdoors to observe sunlight and shadows early in the morning and again around noon. Help children compare their shadows at different times. D. When it is raining gently, take the children outside to feel and see and smell the rain. Let them try to catch drops of rain on their tongues. Let them describe the sights, sounds, and feelings experienced during and after the rain. SITE: I. A. Observe changes in the trees and plants with each seasonal change. B. Collect items that reflect seasonal changes.	

KEY CONCEPTS Adaptation

CONTENT AREA Science

GRADE LEVEL K

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

Bear in a Cave

Here is the cave
 (Cup left hand to make cave)
And here is bear.
 (Raise left thumb)
And here comes the wind,
 (Flutter fingers of both hands)
And its cold, blistery air.
Come, little bear
 (Beckon with right index finger)
And hurry inside.
The cave is a warm place,
In which you can hide.
 (Left thumb moves into cupped right hand.)

RESOURCE MATERIALS

Books
- Fisher. Now that Days are Colder. Bawmar
- Burmingham. Seasons. Bobbs Merrill Co.
- McGrath. About Clouds. Melmont.
- Martin. Weather. Holt, Rinehart, Winston.
- Tresselt. Rain Drop Splash Scott Foresman.
- Ets, Gilberto and the Wind. Scott Foresman.

KEY CONCEPTS Adaptation
CONTENT AREA Science
GRADE LEVEL K
UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

They fall on the housetops all through the night.
(Make pointed roof with fingers, rest head on hands)
They cover the bushes wherever they fall
(Flutter fingers again)
Making each bush like a round popcorn ball!
(Make circle with both hands.)

Five Little Snowmen

Five little men all made of snow.
Five little snowmen, all in a row.
Out came the sun and stayed all day.
The first little snowman melted away.
(Repeat with second, third, fourth, and fifth).

In Wintertime

Into their hives the busy bees crawl.
(Make 10 fingers walk)
Into the ant hills go ants one and all.
(Continue same motion)
The brown caterpillars have hidden their heads.
(Put one fist under opposite arm)
They spin cocoons for their snug little beds.
(Make spinning motions with free forefingers)
The squirrels have gone to their holes in the tree.
(Move hands behind back)
The bird nests are empty; no birds do we see.
(Show Palms)
The elves have all gone for the winter, we know.
There isn't a person who knows where they go.
(Fold hands)

KEY CONCEPTS Adaptation

CONTENT AREA Science

GRADE LEVEL K

UNIT Weather

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	Films from Region X: MP 1422 Fall Brings Changes MP 4658 Farm Family in Autumn MP 1423 Spring Brings Changes MP 1063 Winter comes to the Forest MP 1417 Clouds MP 1418 A First Film on the Wind MP 1709 I Like Clouds	

KEY CONCEPTS Pollution, Stewardship, Conservation

CONTENT AREA Science

GRADE LEVEL 1

UNIT Stewardship and Pollution

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To develop a sense of self in relationship to the eco-system. (6)	CLASSROOM: 1. A. Role Playing: Pretend you are a flower in bloom. The air is polluted. Express how you feel. B. Draw a picture of a flower in polluted air. C. Write a story about how plants might feel in polluted air. D. Write or discuss: What can I do to enjoy the out-of-doors more often. E. Plan a trip to a near-by park or picnic ground to see how our environment is shared by people. F. Discuss how we should take care of public grounds and property. CAMPUS AND/OR SITE: 1. A. P.E. Play "Squirrels and Trees". Discuss how this game can illustrate the plight of animals looking for a home. Two children clasp hands to form a tree. One squirrel is placed in each tree. One odd squirrel is without a tree. "It" is the fox and he chases the squirrels. The squirrel reaches safety when he takes a tree and the other squirrel must run. If a squirrel is caught he becomes the fox. B. Discuss reasons for sidewalks. (If everyone walks on the grass, the grass will die and a path will be worn.) Observe paths worn by students who have not followed sidewalks and note lack of vegetation.	Region X Films: 1. Birds, Baboons, and Other Animals: Their Struggle For Survival. 2. Birds: How They Live, Where They Live--A First Film On Bird Ecology. 3. Daffodils. 4. Ecology. 5. How To Make A Dirty River. 6. Junkdump. 7. Man Uses and Changes the Land. 8. Secrets of the Underwater World. 9. Small Animals of the Plains. 10. State of the Earth. 11. The Tree. 12. What's Alive.

KEY CONCEPTS Pollution, Stewardship, Conservation

CONTENT AREA Science

GRADE LEVEL 1

UNIT Stewardship and Pollution

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To help student understand pollution of the earth and what they might do to prevent it. (2,3,4,5,6)	CLASSROOM: 2. A. Teacher takes wastebasket and throws paper all over the room. Wait for the children's response, then ask: What have I done? How does this make the room look? What would our room look like if we never cleaned it up? What do you call a person who throws junk all over? (if they do not respond litterbug, the teacher asks: Have you ever heard of a litterbug?) B. Show either Litter, Litter Everywhere or Our Mountains of Trash. C. Discuss: Is litter garbage? Children should decide that garbage is garbage when put in its correct place. Garbage becomes litter when not properly disposed of. D. Teach the poem: "There were some pieces of paper Lying on the land I picked up all that litter And put it in my hand. I took the litter with me Til I found a garbage can My litter then was garbage Ready for the garbage man." E. Experiment: A child is to close his mouth and pinch his nose while the teacher counts to 10. Child then tells how he feels without a supply of air. F. Put up a bulletin board with many pretty flowers. First admire the flowers. Have each child pick one flower. Observe how the bulletin then looks. Discuss how the same thing happens when things in nature are destroyed.	Region X Films: 1. Litter, Litter Everywhere. 2. Our Mountains of Trash. Time Life, Education, 1972. Smoky Bear Posters, Numbers 13 and 33, U.S. Dept. of Agriculture, Forrest Service, Washington, D.C. "Woodsy's Campground Detective Game" from "Give a Hoot, Don't Pollute" collection, U.S. Dept. of Agriculture, Forrest Service, Washington, D.C.

KEY CONCEPTS Pollution, Stewardship, Conservation

CONTENT AREA Science

GRADE LEVEL 1

UNIT Stewardship and Pollution

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM: (Continued) 2. G. Play the "Litterbug Game". Each child is to find something he no longer wants. Allow one child to throw his unwanted item on the floor. The change is not too bad. But then allow several children to do the same thing. Observe. H. Invite a boy scout or scout master to speak on caring for our woods. I. Draw a pretty, well-kept yard or a beautiful outdoor scene such as a park. Exchange papers and put in trash or other litter that people throw around to mess up the environment. J. Color Smoky Bear posters numbers 13 and 33, U.S. Dept. of Agriculture, Forrest Service, Washington, D.C. K. Play "Woodsy's Campground Detective Game" from the "Give a Hoot, Don't Pollute" collection, U.S. Dept. of Agriculture, Forrest Service, Washington, D.C. L. Decorate large bags with signs like "Don't be a Litter bug" to be used at the site or campus for a "trash scavenger hunt". CAMPUS AND/OR SITE: 2. A. "Trash Scavenger Hunt" - Make a list of trash items. Assign points for each item. (Ex: 3 points for tin can, 2 points for gum wrapper, 1 point for popsicle stick, etc.) Divide class in groups. Give each group a list. Set a time limit for the hunt. The group with the most points wins.	

KEY CONCEPTS Conservation

GRADE LEVEL 1

CONTENT AREA Science

UNIT Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To recognize that the earth consists of matter such as air, water, soil, rocks, and other living things. (3, 5)	CLASSROOM: 1. A. Discuss pp. 56-57, L.C. #2 in S.B. TM. B. Display globe. (L.C. #3, p. 57 in S.B. TM.) C. Make a matter chart. (L.C. #1, p. 56 in S.B. TM.) D. Discuss pp. 58-59, L.C. #1, 2, 3, 4 in S.B. TM. E. Do Extension on p. 59. Materials needed: orange. F. Discuss pp. 60-61, L.C. #1, 2, 3 in S.B. TM. G. Do L.C. 4 on p. 61. Materials needed: ice, glass container. H. Discuss pp. 64-65, L.C. #2, 3 in S.B. TM. I. Discuss pp. 70-71, L.C. #1-3. J. Do Activity on p. 71, L.C. #3, 4. Materials needed: glass, water, straw. CAMPUS AND/OR SITE: 1. A. Take a walk. During the walk, discuss present land use of area: recreation, roads, residential, commercial and industrial use. Let children imagine the use of the area before the school and surrounding area were developed. B. Discuss geological features of the area. Draw map of area noting specific natural landmarks. C. To make children aware of what is going on underfoot, mark off a one meter square and let children observe the square noticing plants (living and dead), insect life, etc.	Books: 1. Everybody Needs A Rock, Byrd Baylor, Chas. Scribners, New York, 1974. 2. Let's Find Out About Earth, David C. Knight, Franklin Watts, Inc., N.Y., 1968. 3. Rocks and Minerals, Lou W. Page, Follett Pub. Co., Chicago, 1962. 4. The Wonder of Stones, Roma Ganse, Thomas Y. Crowell, N.Y., 1963. 5. Understanding Your Environment, Grade 1, Silver Burdett. 6. What's Inside the Earth, Herbert S. Zim, William Morrow & Co., N.Y., 1953.

KEY CONCEPTS Conservation

GRADE LEVEL 1

CONTENT AREA Science

UNIT Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To observe and discuss factors that cause change in the earth's surface. (2, 5, 6)	CLASSROOM: 2. A. Do L.C. #1, 2, 3 on pp. 62-63. Materials needed: teakettle, water, hot plate, glass, fruit juice, ice cubes, tray, toothpicks. B. Read and discuss pp.72-73, L.C. #1 and 2. C. Do L.C. #1, 2, 3, 4, 5 on pp. 74-75 in S.B. TM. Materials needed: marbles, hot plate, pan, water, jar with cap, cloth, freezer, soil or sand, block of wood. D. Read and discuss pp. 76-77, L.C. #1, 2, 3. Materials needed: pictures. E. Pack sand in tote tray. Carefully add water and place a small sponge in the water. Gently move back and forth to produce a wave action on the sand. Observe and discuss change taking place in the sand. CAMPUS AND/OR SITE: 2. A. Take a walk and discuss changes which occur in the area. Note whether changes were caused by wind, water, heat or man. B. Observe erosion, decaying matter, roots without soil caused by creek bed and trails worn by people.	7. Your Changing Earth, Hy Ruchlis, Harvey House, Inc. N.Y., 1963. Region X Films: 1. Air: A First Film. 2. Air All Around. 3. Explaining the Ocean. 4. Finding Out About Rocks. 5. First Film On Wind. 6. How Air Helps Us. 7. Man Uses and Changes the Land. 8. Rocks: Where They Come From. 9. State of the Earth. Filmstrips: 1. Air Around Us. 2. Air Helps Things To Float In Water.

KEY CONCEPTS Conservation

GRADE LEVEL 1

CONTENT AREA Science

UNIT Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To collect, describe, and compare rocks and soil and group them as to similarities and differences. (5)	CLASSROOM: 3. A. Bring rocks to class and compare. (L.C. #1, p. 64 in S.B. TM.) B. Test for hardness of rocks. (L.C. #1, p. 66 in S.B. TM.) C. Discuss pp. 66-67. (L.C. #2,3 in S.B. TM.) D. Do activity on pp.68-69, L.C. #1,2 in S.B. TM. Materials needed: soil, water, jar. CAMPUS AND/OR SITE: 3. A. Get soil samples on campus or site. (L.C. #4, p. 67 in S.B. TM.) B. Collect rocks from campus and compare with rocks brought into class from other areas.	3. Air Is Everywhere. 4. Air Is Matter. 5. Air Is Real. 6. Air Pushes Against Things 7. Finding Out About Land, Air, Water. 8. Finding Out About the Sky. 9. Kinds of Matter. 10. Living Things Need Air. 11. Nature's Water Cycle. 12. The Earth: A Great Storehouse. 13. Rocks and Minerals. 14. Using Air.

KEY CONCEPTS Interaction

GRADE LEVEL 1

CONTENT AREA Science

UNIT Senses

OBJECTIVES

1. To develop an awareness of our natural environment through the use of our senses. (4)

LEARNER ACTIVITIES

CLASSROOM:

1. A. "How Do You Find Out"--Do lesson capsule (L.C.) #1, p. 6; #2, p. 6; #3, p. 7; #4, p. 11; #5, p. 11.
   B. Play "Smell Detective" using chalk, crayons, books, clay, paint, etc.
   C. Set up a Science Center using idea in L.C. #3, pp. 12-13.
   D. Set up a Science Center with a large sign "Fragrances of the Earth." Arrange fragrance samples collected on campus or site.
   E. Make a list of things expected to see at the site.
   F. Read and discuss or view and discuss books, films, or filmstrips pertinent to these activities.

CAMPUS AND/OR SITE:

1. A. Play "Smell Detective" outdoors.
   B. Tape sounds outdoors.
   C. Sit outside and draw what you see.
   D. Find natural things that have a fragrance (soil, leaves, grass, flowers, bark). Take samples being careful not to damage the natural beauty. Put the samples in clear plastic containers. Cover and label containers to keep fragrance.
   E. Make a list of things seen at the site and compare with the list of things they expected to see.

RESOURCES

Books:

1. About Four Seasons and Five Senses, Ruth Radlauer, Melmont, Inc., N.Y., 1960.
2. Find Out By Touching, Paul Showers, Thomas Y. Crowell Co., N.Y.
3. Follow Your Nose, Paul Showers, Thomas Y. Crowell, N.Y.
4. Look Again, Richard Browner, Atheneum Press, N.Y.
5. My Five Senses, Aliki, Thomas Y. Crowley, N.Y., 1962.
6. Taste, Touch, and Smell, John Day, N.Y., 1966.
7. The Human Senses, Jeanne Bendick, Franklin Watts, N.Y., 1968.

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 1

UNIT Senses (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
		8. The Listening Walk, Paul Showers, Thomas Y. Crowell, N.Y. 9. What Is Sour? What Is Sweet?, Bill Martin, Jr., Holt, Rinehart, & Winston, N.Y. 10. Understanding Your Environment, Grade 1, Silver, Burdett. Region X Films: 1. Our Wonderful Ears and Their Care. 2. Our Wonderful Eyes and Their Care. 3. You and Your Ears. 4. You and Your Eyes. 5. You and Your Five Senses. 6. You and Your Sense of Smell and Taste. 7. You and Your Sense of Touch.

KEY CONCEPTS Interaction

GRADE LEVEL 1

CONTENT AREA Science

UNIT Senses

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To identify objects in nature by touch, sight, smell, and hearing.	CLASSROOM: 2. A. Read and discuss Lesson Capsule(L.C.) 2, p.8, and L.C. 3, p. 9, in S.B. TM. B. Do Extension Activity, p. 9. Materials needed: clock, drum, keys, whistle, bell. C. Do L.C. 2 in S.B. TM, p. 10. Materials needed: jars or boxes-banana, cinnamon, pine needle soap. D. Discuss spells of different seasons. (L.C. 3, p. 10, S.B. TM.) E. Make a five-part Season chart on bulletin board or ditto for each child. The chart headings should include the following: See, Smell, Hear, Taste, Feel. Under each sense paste or draw a picture in the catagory most appropriate. F. Do L.C. 2, pp. 14-15 in S.B. TM. Materials needed: paper squares. G. Do Extension Activity on p. 15 in S.B. TM. Materials needed: buttons or paper markers. H. "Feel It"-Place natural things in paper bag. Describe how it feels and guess after each clue. I. Make a chart of Pleasant and Unpleasant Odors. Find pictures from magazines of things that produce odors such as matches, car exhaust, sauerkraut, flowers, gasoline, bubble bath, etc. CAMPUS: 2. A. Give each student a tag with a sense description phrase on it. Then try to tie the tag to something in the classroom, school campus, or site that would be described with that term. Examples: fuzzy, dark green, smells sweet, smooth, rough, small, etc. B. Give each child a small square of color. He should then try to find in nature something of the same color.	Filmstrips: 1. Learning About Our Ears, with record. 2. Learning About Our Eyes, with record. 3. Learning About Our Skin, with record. 4. Our Senses-Hearing, with cassette. 5. Our Senses-Seeing, with cassette. 6. Our Senses-Touch, Taste, Smell,with cassette.

KEY CONCEPTS Interaction

GRADE LEVEL 1

CONTENT AREA Science

UNIT Senses (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 2. A. Small group or whole class must sit outdoors being as quiet as possible. Listen to all the sounds of nature for two minutes. Discuss and record. B. Assign small group to explore for specific things. Examples: 1. A listening group (with a parent recorder). 2. A group who will look for specific colors. 3. A group who will look for shapes. 4. A group who will look for things that are smooth, rough, sticky, sharp, etc. 5. A group that will find things with fragrances. Each group will have a parent or teacher recorder and all will share in the classroom.	

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 1

UNIT Senses

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To classify objects in size, shape, color, and texture.	CLASSROOM: 3. A. Sort objects - Do L.C. #1, p. 8 in S.B. TM. B. Discuss picture on p. 8 (L.C. #2, p. 8) in S.B. TM. C. Sort natural objects such as leaves, seeds, flowers, and rocks according to size, shape and color. D. Play leaf lotto. E. Get a variety of crayon rubbings from nature. Use rubbings and cut out shapes (such as tree bark, leaves, etc.) Glue these shapes to a background piece of paper to create a picture. CAMPUS: 3. A. Play a matching game: big, little--green, not green--alive, dead--rough, smooth--etc.	

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution

CONTENT AREA Science

GRADE LEVEL 1

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To discuss factors which influence plant growth and then observe growing things over a set period of time. (1,2,4,5)	CLASSROOM: 1. A. Silver Burdet TM, Lesson Capsules (L.C.) #1-6, pp. 84-85; L.C. #1-2, pp. 88-89; L.C. #1-2, Extension Activity. B. After seeds are planted, nurture some and neglect others in different ways; i.e., lack of water, light, air. After a week or so, compare differences in plants. Make a comparative chart. C. Set up a science table so that children can expand on activities already discussed. Select library books, pictures, magazines which pertain to subject. D. Have children bring quart jars and small plants from home to make terrariums. Provide soil and saran wrap. Add bits of bark, rocks, or twigs gathered from campus. CAMPUS AND/OR SITE: 1. A. Adopt-A-Tree - Select a tree on campus for "adoption". Study characteristics of tree. Keep a chart of changes which occur during the school year. Photograph tree at different times of year. B. Take several campus hikes during year to observe plant life. Note changes which occur in trees, grass, shrubs, etc. C. Collect dead leaves or twigs, pine cones, burrs, etc. to make a Nature Mobile. D. Follow the marked trails at the site. Observe and discuss the types of plants. E. Select several plants to observe at a later time. Mark the plant by tying a piece of plastic ribbon on it. Note characteristics and record at each observation.	Books: 1. A Tree Is A Plant, Clyde Bulla, Thomas Y. Crowell, New York. 2. How A Seed Grows, How Plants Grow, Helene Jordan, Thomas Y. Crowell, New York. 3. I Found A Leaf, Sharon Lerner, Lerner Pub. Co., Minneapolis, Minns, 1964. 4. Now You Know: (series) How Plants Grow, Many Plants, Plants and Their Seeds, Plants We Need, Encyclopedia Britannica, Educational Corp., Chicago/Toronto, 1973. 5. Plant Fun, Anita H. Soucie, Four Winds Press, 1974. 6. Plants On The Go, Eleanor Heady, Parents Magazine Press, New York, 1975.

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution

GRADE LEVEL 1

CONTENT AREA Science

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To study and identify local poisonous plants and to learn caution in consuming edible plants. (2)	CLASSROOM: 2. A. Gather pictures of poisonous plants of the southwest. Observe and discuss characteristics of the plants, precautions to be taken, and possible medication that could be used in treatment of plant poisoning. B. Invite a student from the high school Advanced Placement Biology Class to present a lesson using pictures and lecture on poisonous plants. CAMPUS AND/OR SITE: 2. A. Observe plants on campus. Search for poisonous ones. If any are found, discuss ways to rid the campus of the plants. Follow through. Draw map to show locations of the plants. Stress caution.	7. Seeds By Wind and Water, Helene J. Jordan, Thomas Y. Crowell, New York. 8. Seeds, Seeds, and More Seeds. 9. Seeds Are Wonderful. 10. Understanding Our Environment, Grade 1, Ellwood, G. Mallinson, Silva, Silver Burdett General Learning Corp., Morristown, N.J., 1975. Region X Films: 1. Field and Meadow. 2. Plants That Grow From Leaves. 3. Secrets of the Plant World. 4. Stems and Roots. 5. Wildflowers of the Field and Meadow. 6. Why Plants Grow Where They Do.

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution
CONTENT AREA Science
GRADE LEVEL 1
UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To understand that plants and animals must adapt to special conditions in order to survive. (2,5)	CLASSROOM: 3. A. See Silver Burdett TM, L.C. #3, p. 79; L.C. #1-3, pp. 82-83; Extension Activity, p. 83. B. List the ways plants adapt to cold conditions, dry conditions, and light conditions. CAMPUS AND/OR SITE: 3. A. On a hike on campus or nature site, observe types of plants growing on prairie land, wooded area, marsh area, and along the creek. Discuss reasons for such growth and draw a map to show density of plant life in various areas.	Filmstrips: 1. Balance of Nature. 2. Deserts. 3. Food For A Big City. 4. Finding Out About Seeds, Bulbs, and Slips. 5. Finding Out How Plants Grow. 6. How Do Plants Get Where They Grow. 7. How Do Plants Help Us. 8. Johnny Appleseed. 9. Man's Basic Need: Food. 10. What Makes A Seed Sprout.

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution

CONTENT AREA Science

GRADE LEVEL 1

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To identify the main parts of plants and seeds. (2)	CLASSROOM: 4. A. See Silver Burdett TM, L.C. #1-3, pp. 86-87; L.C. #1-6, pp. 90-91; Extension Activity, p. 93. B. Collect household plants and observe and identify parts of the plants and discuss functions of the parts. C. Soak a jarful of lima beans overnight. Let each child break open a bean to see the tiny plant inside. D. Discuss seeds we eat and collect edible seeds. Make a chart. Have children bring cereal from home and put the cereal under the seed it is made from: Rice Chex, Rice Crispies, Wheat Chex, Corn Flakes, etc. CAMPUS AND/OR SITE: 4. A. On a walk around the campus or nature site, continue observation and discussion of plant parts. Let children select a plant to draw and label parts. B. Look for plant seeds on campus. Place a few seeds in plastic bag and start a seed identification chart. Put a picture of the fruit or flower that comes from the same plant. C. Divide class into 2 groups. One group gathers leaves, makes rubbings and other team goes out to find the trees the leaves came from. D. Collect seeds from plants, label, and add to chart. E. Each child collects leaves of different shapes. On return to school press between 2 pieces of plastic contact paper, pink edges and use as placemat. Use only 1 leaf to make a bookmark. Punch hole in one end, tie a piece of ribbon about 6 " long.	

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution

GRADE LEVEL 1

CONTENT AREA Science

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. To classify methods by which seeds are transported. (2,5)	CLASSROOM: 5. A. Silver Burdett TM, L.C. # 1-3, pp. 92-93. B. Display a small parachute, large fish book, pop-gun with cork, a toy boat, a maple limb, a mature dandelion flower (or picture), a beggar tick plant, a bean pod. Identify the objects and discuss the relationships in terms of seed dispersal. C. Discuss nature's dispersal of seed's and man's dispersal of seeds for food reproduction. CAMPUS AND/OR SITE: 5. A. On a walk around the campus observe location of plants. Discuss ways the seeds may have been deposited in order for the plants to grow where they are. Gather different types of traveling seeds. B. S.B. TM, Extension Activity, p. 93. C. Let children walk in tall grass and then check clothes for "hitchhikes" seeds. Discuss.	

KEY CONCEPTS Adaptation, Energy, Interdependence, Resource, Distribution

CONTENT AREA Science

GRADE LEVEL 1

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. To discuss the ways that man and plants are interdependent. (2,3,5)	**CLASSROOM:** 6. A. L.C. # 1-2, pp. 96, 97; Extension Act., p. 97. B. List different purposes a plant serves in a community. C. Discuss food chain or web and construct a web. On a large sheet of poster board draw a circle at the center. Place a paper fastener at the center and label "Sun/Soil". At random intervals on the poster board attach paper fasteners. By the paper fastener head glue a picture of animals, plants, and persons. Tie one end of a length of yarn on the paper fastener head on the "Sun/Soil" center. Now follow a food chain or cycle--grass, cow, man; corn, pig, man; grass, insect, snake, hawk. Each animal dies and returns to the soil. **CAMPUS AND/OR SITE:** 6. A. Walk around the campus or site. Observe and discuss the webs of life noticed on the walk--soil, tree, pecan, squirrel, etc. Return to classroom and let children draw a web of life. B. At various areas of site discuss prairie food chain, woodlands food chain, creek food chain. C. Search for signs that animals use the areas--nests, tracks, nuts, holes in trees. Discuss relationship between animal and the area.	

KEY CONCEPTS Animals

CONTENT AREA Science

GRADE LEVEL 2

UNIT Animals and More Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. The child will be able to: a. Name and discuss kinds of animals and compare their similarities and differences. (2,3) 2. Observe and describe characteristics of animals which live in certain environments. (2,3) 3. Classify and group animals on the basis of body coverings, means of locomotion, food gathering and eating habits. (2,3)	CLASSROOM: 1. A. Do "Lesson Capsule" activities 1-3 T.M. pp. 28-29 B. Explain "Science Background" in T.M. p. 29 C. Do "Extension" on p. 28. D. There is an interesting story about a crayfish in Ranger Rick "The Shy Crayfish", Oct. 1976, pp. 32-35 E. Choose a film from those listed under Resources for objective 1. F. There are many audio tapes available at Region X. G. Do Individualized Extension Activity, p. 7 2. A. Read and discuss information on pp. 30-31 in T.M. B. Do "Lesson Capsule" activities 3-4 in T.M. p. 31. C. Do "Lesson Capsule" activity 1 in T.M. p. 32 D. Have children collect and classify pictures of animals on the basis of habitat: forest, artic dessert, pond, tropical forest, etc. Good resources for these are National Geographic World, Ranger Rick, and National Wildlife. E. Do "Extension" activity in T.M. p. 31. F. Do Individualized Extension Activity pp 9-10. G. Choose a film from resources. H. Choose an audio tape from resources. 3. A. Do "Lesson Capsule" activities 1,2,5 in T.M. pp. 34-35. B. Explain "Science Background" in T.M. p. 35. C. See the National Geographic World, "Leaf Look-Alikes", March, 1977, pp. 12-15. National Geographic World, "How Many Birds Can You Find?" Jan. 1977, pp. 18-19. D. Do "Lesson Capsule" activities 1 and 2 in T.M. pp. 36-37. E. Do "Extension" in T.M. p. 37. *pp. 38-39 are included with objective 4. F. Read and discuss pp. 40-41 in T.M.	Science - Understanding Your Environment Silver Burdett Region X films Animal Babies Grow Up MP1055 Animals are Different and Alike MP1054 Monkeys and Apes-An Introduction to the Primates MP1411 Our Animal Neighbors MP 1057 Tadpole Tale MP4002 Tad the Frog MP1039 Wildcat Family; The Cougar MP4584 Wild Dog Family - The Coyote MP4583 Zoo Baby Animals MP1103 Secrets of an Insect World MP4574 Of Cats and Men MP4570 Butterfly MP1488 A First Film on Bird Ecology MP1406 Insects That Help Us MP1410 Instincts in Animals MP1525 Region X Films We Explore Ocean Life MP1059 We Explore the Field and Meadow MP1060 We Explore the Stream MP1061

KEY CONCEPTS Animals

CONTENT AREA Science

GRADE LEVEL 2

UNIT Animals and More Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. Cite that all animals need food, air and water to survive and to explain why animals must adopt to their environment in order to survive. (2,3,5) 5. Describe the concept of a food web and to understand that all living things depend directly or indirectly on green plants for food. (2,5)	G. Explain "Science Background" p. 41 in T.M. *pp. 42-45 are included with objective 5. H. Read and discuss pp. 46-47 in T.M. I. Do "Lesson Capsule" activity 3 p. 47 in T.M. J. Explain "Science Background" p. 47 in T.M. K. See National Geographic World "Cheetahs: Reaching Toward Doom," August, 1976, pp. 20-27 L. Do "Lesson Capsule" activities 1-2 in T.M. pp. 48-49. M. Do "Extension" pp. 49 in T.M. See National Geographic World, "Track the Animals," Jan., 1977, pp. 20-21. N. Do "Lesson Capsule" activities 1-3 in T.M. pp. 50-51. O. Read and discuss pp. 52-53 in T.M. P. Explain "Science Background" on p. 53 in T.M. Q. Do "Lesson Capsule" activities 2-3 on p. 53 in T.M. R. Do "Extension Activity" p. 53 in T.M. S. Do Individualized Extension Activities 1. pp. 11-12 body coverings 2. pp. 13-14 locomotion 3. pp. 15-16 eating habits 4. pp. 17, 18, and 19 body structures 4. A. Do "Lesson Capsule" activities 1, 2 pp. 38-39 in T.M. B. These magazine articles show various animals gathering food: 1) National Geographic World, "Save the Eagle," July, 1976 pp. 10-14. 2) National Wildlife "Leaping into Trouble" Sept. 1976, pp. 36-42, 3) National Geographic World "Sharks!" Jan. 1976 pp. 4) Ranger Rick, "A Lion's Share", Feb., 1977, pp. 29-31. 5) Ranger Rick "Snake Rats," Oct., 1976, pp. 3-7.	Audio Tapes - Region X How the Leopard Got Its Spots AT 2326-15 In the Deep (Deep Sea-Diving) AT 970-15 Five Submarines The Turtle AT 2689-15 Audio Tapes Birds Come Home, The AT 199-15 Almost Human Animals AT 2673-15 Animals From Faraway AT 181-15 Animals - The Craziest People AT 2674-15 Camel Who Took a Walk, The AT 735-15 Elephant's Child, The AT 2317-15 Books Why Birds Migrate by May The Penguins Are Coming by Penney Grasshoppers by Pfadt Ants by Schoenknecht All Kinds of Babies by Selsam Benny's Animals and How He Put Them in Order by Selsam Egg to Check by Selsam Hidden Animals by Selsam

KEY CONCEPTS Animals

CONTENT AREA Science

GRADE LEVEL 2

UNIT Animals and More Animals

OBJECTIVES

LEARNER ACTIVITIES

5. A. Do "Lesson Capsule" activities 1,2,3, pp. 42-43 in T.M.
   B. Do "Lesson Capsule" activities 1-3, p. 45 in T.M.
   C. Do "**Extension" p. 45 in T.M. Posters and "Learning Units" can be found in the Instructor beginning with Aug./Sept., 1975.
   D. Explain "Science Background" p. 45 in T.M.
   E. Do Individualized Extension Activity pp. 15-16.
   F. Objective: The student will able to explain how pollution effects our food supply.

Materials: Pictures of plants, plant eating animals. crayons, pencil, paper.

Procedure: Discuss several food chains such as (grass-cow-man) (kelp-small fish-large fish-man). Have students draw pictures of some of these food chains. Discuss ways pollution affects each of these food chains such as (a) grass-harmed by air pollutants, (b) animals-harmed by insecticides, (c) men-harmed by increased poisons from all sources.

Thought Questions:
1. How can man avoid being poisoned by himself?
2. Do you think we should go back to living like we did hundreds of years ago. Discuss advantages and disadvantages. Role play different situations comparing the old and modern ways of food getting.

Results: The student is able to explain how pollution affects different food chains.

Conclusion: Pollution affects man's food supply.

RESOURCES

When An Animal Grows by Selsam
Birds by Wasson
Alphabet of Puppy Care by Weil
Brian Wildsmith's Wild Animals by Wildsmith
Brian Wildsmith's Fishes by Wildsmith
Birds That Hunt by Jace
Humming Bird by John
What Makes a Bird a Bird by Garelick
A Pocket Full of Cricket by Caudill
Insects by Broiulette
Wildlife in our National Parks by Colby
Robins by Mason

Region X Films
How Do They Move? MP1550
Nature's Strongest Creatures MP4582
Hands MP4835
Birds, Baboons and Other Animals: Their Struggle for Survival MP4635
Animals Protect Themselves MP1151

KEY CONCEPTS Animals

GRADE LEVEL 2

CONTENT AREA Science

UNIT Animals and More Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

G. Conclude the unit by discussing the questions on p. 54 in the T.M.

CAMPUS:

1. A. Have the children place small plastic containers (the ones that Kodak film comes in) in the ground, leaving only the top showing. Then put sugar or peanut butter inside. The next day have the children check to see what animals have come for the bait. This is a good way for the children to see what animals are on their campus.

B. Discuss why they live in this particular environment as to some other geographic environment consider such factors as climate, terrain, food sources, water supply, etc.

C. Be sure the children release the animals when the discussion is over.

D. "Lesson Capsule" activity 3 in T.M. p. 49, would be an interesting campus activity.

E. Have student search the campus area for animal existence, such as bird feathers, insect shells, butterfly or moth wings, tracks. Discuss children's findings on the basis of how animals differ in body coverings, body structure, means of locomotion, food gathering and eating habits. This would also be excellent at the site.

SITE:

1. A. It would be possible to utilize the site as made up of several "mini environments" from which to compare animals that live in the woods, versus those that live in the grassy areas. There is also a tree that has a bee hive in it.

KEY CONCEPTS Animals

GRADE LEVEL 2

CONTENT AREA Science

UNIT Animals and More Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	5. A. Do"Lesson Capsule" activities 1,2,3, pp. 42-43 in T.M. B. Do "Lesson Capsule" activities 1-3, p. 45 in T.M. C. Do "**Extension" p. 45 in T.M. Posters and "Learning Units" can be found in the Instructor beginning with Aug./Sept., 1975. D. Explain "Science Background" p. 45 in T.M. E. Do Individualized Extension Activity pp. 15-16. F. Objective: The student will able to explain how pollution effects our food supply. Materials: Pictures of plants, plant eating animals, crayons, pencil, paper. Procedure: Discuss several food chains such as (grass-cow-man) (kelp-small fish-large fish-man). Have students draw pictures of some of these food chains. Discuss ways pollution affects each of these food chains such as (a) grass-harmed by air pollutants, (b) animals-harmed by insecticides, (c) men-harmed by increased poisons from all sources. Thought Questions: 1. How can man avoid being poisoned by himself? 2. Do you think we should go back to living like we did hundreds of years ago. Discuss advantages and disadvantages. Role play different situations comparing the old and modern ways of food getting. Results: The student is able to explain how pollution affects different food chains. Conclusion: Pollution affects man's food supply.	When An Animal Grows by Selsam Birds by Wasson Alphabet of Puppy Care by Weil Brian Wildsmith's Wild Animals by Wildsmith Brian Wildsmith's Fishes by Wildsmith Birds That Hunt by Jace Humming Bird by John What Makes a Bird a Bird by Garelick A Pocket Full of Cricket by Caudill Insects by Broiulette Wildlife in our National Parks by Colby Robins by Mason Region X Films How Do They Move? MP1550 Nature's Strongest Creatures MP4582 Hands MP4835 Birds, Baboons and Other Animals: Their Struggle for Survival MP4635 Animals Protect Themselves MP1151

KEY CONCEPTS Animals

CONTENT AREA Science

GRADE LEVEL 2

UNIT Animals and More Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	G. Conclude the unit by discussing the questions on p. 54 in the T.M. CAMPUS: 1. A. Have the children place small plastic containers (the ones that Kodak film comes in) in the ground, leaving only the top showing. Then put sugar or peanut butter inside. The next day have the children check to see what animals have come for the bait. This is a good way for the children to see what animals are on their campus. B. Discuss why they live in this particular environment as to some other geographic environment consider such factors as climate, terrain, food sources, water supply, etc. C. Be sure the children release the animals when the discussion is over. D. "Lesson Capsule" activity 3 in T.M. p. 49, would be an interesting campus activity. E. Have student search the campus area for animal existence, such as bird feathers, insect shells, butterfly or moth wings, tracks. Discuss children's findings on the basis of how animals differ in body coverings, body structure, means of locomotion, food gathering and eating habits. This would also be excellent at the site. SITE: 1. A. It would be possible to utilize the site as made up of several "mini environments" from which to compare animals that live in the woods, versus those that live in the grassy areas. There is also a tree that has a bee hive in it.	

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Mans Interrelationship with His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Explain that man is classified as an animal, and yet he is different from other animals in many ways. (2) a. Skeletal and Muscular System . To explain how the skelton gives shape to the body, supports it and helps it move. . To explain how muscles supply the force to produce different body movements. . To observe that man has an opposal thumb.	CLASSROOM: 1. A. Read and discuss information on p. 133. B. Do "Lesson Capsule" Activity 2 p. 133. C. Do "Extension" in p. 133. D. Explain "Science Background" in p. 133. E. Read and discuss information on p. 134-135. F. Do "Lesson Capsule" Activities 1-4 p. 134-135. G. Do "Lesson Capsule" Activities 1-4 p. 136-137. H. Objective: The student will be able to explain how the skeleton gives shape to the body, supports it, and helps it to move. Materials: Half pint milk cartons, soft flexible wire and a stick. Procedure: Put eight milk cartons through the wire end to end. Have the children experiment with how many ways the milk cartons can move. Then have them see how many ways they can move the stick. Pretend the stick and the cartons are backbones in two live people. Have two children hold them and show how they do such activities as pick up an object from the floor. Have one child at a time demonstrate a movement involving the backbone while other children shape the milk cartons in the way they think the backbone will look during the movement. Label skeletal parts on the attached worksheet. Results: The students are able to explain how the backbone, which is made up of many small bones, gives shape to the body and helps make many movements possible.	Understanding Your Environment Silver Burdett pg. 133-15

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Mans Interrelationship with His Environment (p. 2)

OBJECTIVES

1. b. Nervous system
   - To relate how the nervous system allows man's sense organs to communicate with the brain for thinking and reasoning.
   - To realize that man possesses the unique ability to think and reason.

LEARNER ACTIVITIES

CLASSROOM:

1. H. Conclusion: The backbone of the skelton helps give the body shape, support, and movement.

I. Read and Discuss information on p. 138-139.

J. View Eye Gate filmstrips *Our Senses - Seeing*
Our Senses - Hearing
Our Senses - Touch, Taste and Smell.

K. Do "Extension" p. 139 in SBTM.

L. Do "Lesson Capsule" Activities 2 and 3 in SBTM p. 139.

Supplementary Activities
on the Five Senses

A. Objective: The student will be able to recognize and discriminate between the four tastes.
Materials: Two foods representing the four food tastes. (lemon slices, sour pickles, pretzels, potato chips, hard candy, apple slices, cocoa, creme of tartar, alum)
Procedure: Place the foods on a table in random order and have each food marked by number. The student will taste each food and record his reacttion on the attached chart.
Results: The student will be able to chart his reactions correctly and list other foods for each taste group.
Conclusion: The four food tastes are sweet, sour, salty, and bitter.

B. Objective: The student will be able to recognize likenesses and differences in smells.

RESOURCES

Books:
My Five Senses
Thomas Y. Crowell

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

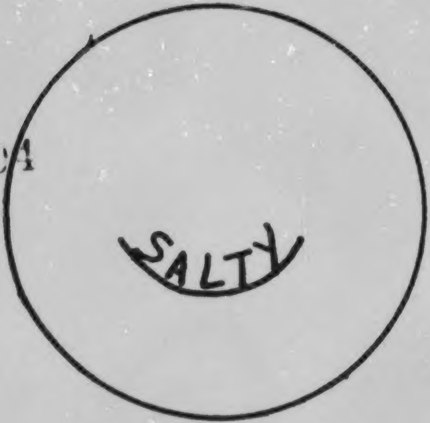
UNIT Mans Interrelationship with His Environment (p. 3)

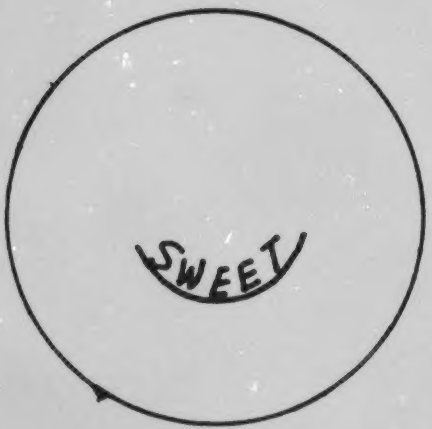
OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	B. Materials: Eight opaque bottles containing perfume, bleach, coffee, alcohol, cinnamon, vinegar, chocolate, detergent, soap. Painted salt shakers work well as smelling bottles. Procedure: Have the students smell each bottle and identify the contents. This should be done as a small group-teacher directed activity. Results: The student will not only be able to identify the contents of each smelling bottle, but will also be able to classify odors such as sweet, strong, unpleasant, etc. Conclusion: Some objects can be identified by their smell. C. Objective: The student will be able to recognize that everything we feel has texture, shape, temperature, and weight. Materials: Blindfold, chosen number of class members. Procedure: Blindfold one child and have him identify another child in the group by feeling the facial area. This should be repeated until everyone has a turn. Results: The children will be able to identify their classmates by using their sense of feel. Conclusion: Faces can be identified by sense of feel. D. Objective: The student will be able to identify different types of sound. Materials: Tape recorder, tape of common place sounds such as water running, door slamming, someone walking, hammerpounding, etc. Teacher recorded directions and answer should be included on the tape. Procedure: Have student listen to the tape at a listening center and record the sounds they hear. Teacher recorded answers provide for self-evaluation. Group discussion would be helpful in reinforcing the objective.	

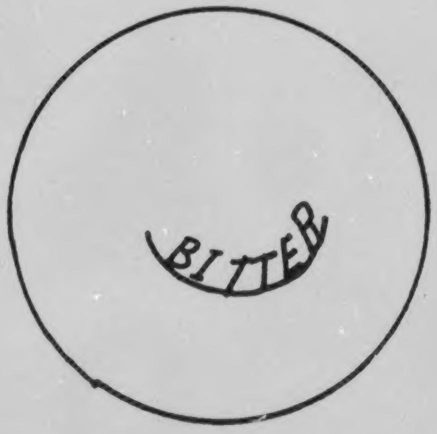
Supplementary Activity A

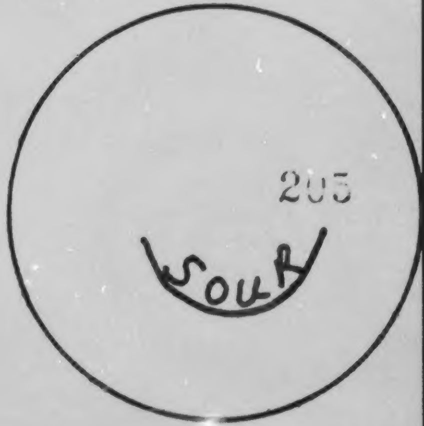
Salty	Sweet	Bitter	Sour

Draw a food face on each plate. Water your smiles!









KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Mans Interrelationship with His Environment (p. 4)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	D. Results: The student is able to recognize and describe different common place sounds. Conclusion: There are different types of sounds heard in our environment. E. Objective: The student will be able to describe different colors, shape, and size. Materials: Crayons, paper, tape recorder Procedure: The students will draw a colored picture of the object they wish to describe. They will then record on tape names of the object. They will then use the tape recorder to describe the object using only color, size, and shape words. In a group discussion the other members of the class will take turns trying to guess the names of each other's objects. Results: The student will be able to describe objects using color, shapes, and size. Conclusion: Objects can be identified by color, shape, and size.	

KEY CONCEPTS Interdependence, Energy, Stewardship
CONTENT AREA Science
GRADE LEVEL 2
UNIT Mans Interrelationship with His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. Explain how man depends on plants and other animals for his food energy. (1,3,5)	CLASSROOM: 1. M. Do "Lesson Capsule" 1-4 p. 140-141. N. View film You - The Human Body #M1470 Region X. 2. A. Read and discuss information on pp. 142-143. B. Do Science Background on p. 143. C. Do "Lesson Capsule" Activities 1-3. D. Objective: Explain how man depends on plants and other animals for his food energy. Materials: One week's menu from the school lunchroom. Procedure: Have the children classify the foods listed for each day of the week in the correct column on student worksheet. After completion of the worksheet have the school cafeteria manager come to the classroom to answer questions and discuss the source of certain food items. Results: The student is able to identify different foods as coming from either plants or animals. Conclusion: All man's foods come from either plants or animals. View a film from those listed under resources for objective 2.	2. Films: Why We Eat Vegetables MP 1017 Region X Where Does Meat Come From MP 1091 Region X Energy Does Help MP 1066 Region X

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Man's Interrelationship with his Environment. (p. 4)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	E. Objective: The student will be able to catagorize foods into the four basic food groups. Materials: Butcher paper, magazines, crayons, pencil, scissors, glue. Procedure: Have students divide up into four groups: Have each group draw or find pictures from either the fruits and vegetables, breads and cereals, milk, or meat food groups and paste them on the butcher paper to make a mural. After the murals are finished have each group discuss their mural with the rest of the class. As a follow-up activity have the children take the prepared food chart home over the weekend and list the foods they eat at each meal in the appropriate column. Return to school for class discussion. Results: The student is able to classify foods into the four basic food groups. Conclusion: The four basic food groups are fruits and vegetables, breads and cereals, milk and meats. Foods that do not fall into one of these catagories are considered extras.	

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Man's Interrelationship with his Environment (p. 4)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	F. Objective: Plan a menu for one day that meets the requirements for a balanced diet using food from each of the four basic food groups. Materials: Pencil, paper, crayons, sample menus from restaurants. Procedure: Divide the class into four groups. Have each group devise a menu for an imaginary restaurant. The menu must include foods and beverages suitable for breakfast, lunch, and dinner. Cover design and prices should be included. There must be a selection of foods from each of the four food groups. One group will then open its restaurant and the other three groups will order either breakfast, lunch or dinner from that restaurant's menu. Group discussion will then evaluate food selections. The students rotate in this manner until each group has opened its restaurant and all children have had a chance to order breakfast, lunch, and dinner. Results: The students are able to plan a menu and select a balanced meal containing foods from the four basic food groups. Conclusion: A balanced meal should contain foods from each of the four basic food groups.	

Classroom Activity (3G)

NAME	Fruits and Vegetables	Breads and Cereals	MiLK	Meat	EXTras
SATURDAY					
SUNDAY					

Cook's Signature: ______________________________

KEY CONCEPTS Interdependence, Energy, Stewardship

GRADE LEVEL 2

CONTENT AREA Science

UNIT Mans Interrelationship with His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. Explain how some of the water and foods that man needs is also needed by some other animals and plants in his environment. (2,5)	CLASSROOM: 3. A. Read and discuss information on p. 144. B. Do "Lesson Capsule" Activities 1-4 p. 144 and 145 C. Explain Science Background on p. 145. D. Read and discuss p. 146-147 in SBTM. E. Do "Lesson Capsule" Activity 3 and 4 p. 147. F. View film: Science For Beginners #MP1073 Region X.	Book: Dependent Plants Bertha M. Parker Milk for You Warren G. Schloat Filmstrip: Learning About Germs Encyclopedia Britannica
4. Explain how man's food and water must be protected from harmful organisms that might cause disease. (2,4,5)	4. A. Read and discuss pp. 148-149. B. Do "Lesson Capsule" Activities 1-4. C. View a film from those listed under resources for objective 4. D. Objective: The student will be able to explain how pollution effects our food supply. Materials: Pictures of plants, plant eating animals, and meat eating animals, crayons, pencil, and paper. Procedure: Discuss several food chains such as (grass cow-man) (kelp-small fish-large fish-man). Have students draw pictures of some of these food chains such as (a) grass-harmed by air pollutants, (b) animals-harmed by insecticides, (c) men harmed by increased poisons from all sources. Thought Questions: 1. How can man avoid being poisoned by himself? 2. Do you think we should go back to living like we did hundreds of years ago. Discuss advantages and disadvantages.	Films: Germs and What They Do MP 1011 Learning About Food Why Be Healthy Let's Keep Food Safe To Eat Mp 1468 Food for the City Produce MP 4458 Wheat and Flour MP 1377 Eat Well, Grow Well MP 1009 Mr. Peanut's Guide to Nutrition MP 7362

KEY CONCEPTS Interdependence, Energy, Stewardship

CONTENT AREA Science

GRADE LEVEL 2

UNIT Mans Interrelationship with His Environment

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. Recognize that man can manage and alter his environment. (6)	CLASSROOM: 4. D. Role play different situations comparing the old and modern ways of food getting. Results: The student is able to explain how pollution affects different food chains. Conclusion: Pollution affects man's food supply. 5. A. In preparation for objective 5, children may write for a free coloring book and other information concerning our environmental responsibility. U.S. Environmental Protection, International Bank Building, 1201 Elm St., Dallas, Tx. 75270. B. Select films, filmstrip and kits from those listed under resources for objective 5.	5. Films: The Tree MP1424 The Tree on the Road to Turndown MP1363 State of the Earth MP4743 Caring for the World MP4847 Litter, Litter, Everywhere MP1636 Pollution MP5003 Lorax, The MP7410 Region X Kits: Nature Study, McGraw-Hill 136000-X Rocks Around Us How Plants Help Man Growing New Plants What Animals Give Man Insect Friends and Enemies Filmstrips: You and Recycling Series The Magician (SVE-224-9 Kuir and the Bottle (SVE-224-10) Water All Around Us (224-11) Trash Treasure Hunt (224-12)

KEY CONCEPTS Interdependence, Energy, Stewardship
CONTENT AREA Science
GRADE LEVEL 2
UNIT Mans Interrelationship with His Environment (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

LEARNER ACTIVITIES

CLASSROOM:

5. C. Objective: The student will be able to identify the kinds of pollution he makes in his own home.

Materials: Pictures of (1) stereo, (2) gas stove, (3) garbage disposal, (4) garbage can, (5) electric can opener, etc.

Procedure: Discuss and illustrate the different kinds of pollution found in the homes such as (1) noise, (2) garbage, (3) gas, (4) gasoline, (5) wastes (6) sewage. Discuss some means of reducing wastes and pollution such as (1) recycling, (2) reusing, (3) converting to electricity, (4) reducing wastes, etc.

Supplemental Information: Things to help ecology at home:

1. Do not use colored paper tissues, towels. (dyes pollute)
2. Use cloth napkins instead of paper.
3. Use a lunch box instead of a paper bag.
4. Reduce your electricity, especially 5 to 7 pm. (more electricity, more dams and power plants)
5. Do not waste water.
6. Give your newspapers to a recycling center.
7. Recycle glass and aluminum. Reynolds Aluminum Recycling 8222 Chancellor, Dallas 634-1556
8. Compost or bury garbage.
9. Return wire coat hangers to the cleaners. 17¢ a pound.
10. Don't buy over-packaged items.
11. Look for greeting cards and stationary made from recycled paper.
12. Buy returnable bottles-they cost less and can be reused often.

Results: The student is able to identify the kinds of pollution in his home and able to suggest means of reducing wastes.

Conclusion: Many kinds [illegible] pollution may exist in the home environment.

RESOURCES

5. Filmstrips
Dash McTrash and Pollution Solution: Learning to Care About Pollution
Series Set (SAC-2020) 5 F/S, 5 Cassettes 30 Coloring Books, Ditto Master, 30-E-for Buttons, Guide and 30 Membership Certificates.
Conservation For Beginners-Series
430-1 Sonny Squirrel and the Pine Trees
430-2 The Deer and the Haystack
430-3 A Picnic for Dick and His Friends
430-4 The Lamb and the Bluebelle
430-5 Susan and the Forest Fire
430-6 The Muddy Raindrops
Energy and You
SVE-400-6 Energy, Using It Wisely
The Earth's Resources, McGraw-Hill (619020-X)
Ocean Resources
Freshwater Resources
Rock Resources
Fuel Resources
Atmospheric Resources
Soil Reso[illegible]ces

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To recognize and give examples of the three states of matter and to demonstrate that air is a gaseous matter. (1,5)	CLASSROOM: 1. A. Do "Lesson Capsule" Activities 1-3, pp. 6-7. B. View a film from these listed under resources for objective 1. C. Do Individualized Extension Activity Page 1 D. Listen to audio tape - Around, Above and below (AT 2134-15) Region X. E. Use ice, liquid water, and steam as examples of the three states of matter. (For a classroom experiment use a hot plate to melt ice and show the transition from a solid to a liquid to a gas. CAMPUS/SITE: 1. A. Give students a piece of paper divided into three columns headed with the words SOLID, LIQUID, GAS. Have students list components evident at the site that would fit in each category. B. Have students work in pairs or small groups with containers labeled SOLID, LIQUID, and GAS, look for materials that could be placed in the appropriate containers.	Understanding Your Environment. Silver Burdett. pp. 6-27. Science - Individual Extension Activities. Silver Burdett pp 1-6. BOOKS: Air by Adler. AIR by Feilen. REGION X FILMS: Molecules: A First Film. MP 1543. Materials of Our World. MP 4042

KEY CONCEPTS Energy, Pollution, Stewardship.

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To use several senses in observing and describing the characteristic of air.	CLASSROOM: 2. A. Read and discuss pp. 8-9. B. View a film from those listed under resources for objective 2. C. Listen to Region X Audio Tape. (AT 2143-15) Envelope Around the World. D. Do Individualized Extension Activity - p. 2. (To test several substances and record evidence that may contain observable amounts of air). CAMPUS/SITE: 2. A. Have students observe and report through the different senses (hearing, smelling, feeling and seeing) evidence that air is matter. For example: hearing-rustling of leaves, flag moving in a breeze; smelling- various seasonal odors; feeling-the push of the wind on student's bodies, temperature of air; seeing-movement of trees and plants, flag moving in the breeze. B. Do *Extension on page 9 in T. M. C. Have students collect materials from campus area or from the site to be tested for air content. Have students submerge individual materials in a clear container of water and observe for air bubbles to rise to surface.	REGION X FILMS: How Air Helps Us. MP 1067. First Film on Wind. MP 1418. Air: A First Film. MP 1416

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT AIR

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To carry out activities that show how air (a gaseous matter) can support objects and exert a push in all directions. (5).	CLASSROOM: 3. A. Do "Lesson Capsule" 1-3, pp 10-11. T. M. B. View a film from those listed under resources for objective 3. C. Do Individualized Extension Activity p. 3. (To test the concepts that air takes up space and pushes in all directions; to record observations of test results). CAMPUS: 3. A. Have students make and demonstrate parachutes, p. 10. B. Have children experiment with air resistance to large pieces of cardboard used as children spin around, run, move up and down, etc. C. Have children construct and fly their own kite. SITE: 3. Have children look for evidence that air does support objects, (i.e. flying birds, falling leaves, clouds, etc..)	REGION X FILMS: Air All Around Us. MP 1360 Air All Around Us. MP 1365 Revised Simple Demonstrations with Air. MP 1143.

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To carry out activities that show that air, as matter, has weight and takes up space. (5).	CLASSROOM: 4. A. Have students do activities shown, pp. 12-19. B. View a film from those listed under resources for objective 03. C. Do Individualized Extension Activity page 3. (To test the concepts that air takes up space and pushes in all directions, to record observations of test results.) CAMPUS/SITE: 4. A. Discuss with students the presence of air all around them. Point out to them that the "invisible nothingness" around them is actually a mixture of tiny particles called molecules that all living things depend on.	

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. To recognize that air is essential for the survival of living things. (4)	CLASSROOM: 5. A. Read and discuss information on pp 20-21, and explain information in "Science Background" p. 21 T.M. CAMPUS/SITE: 5. A. Take children on a walk around the school grounds or site and looking at both plants and wildlife, point out that all things need air for survival. Air contains both oxygen and carbon dioxide gases and that a balance exists between plants and animals in the usage of these two gases. Animals need oxygen for respiration and release carbon dioxide as a by-product. Point out that air is also dissolved in water for utilization by animals such as fish that breathe through gills. Look for evidence of air and/or water pollution that is killing plant life and compare this area to another area with healthy plant growth of similar variety due to a clear air environment.	

KEY CONCEPTS Energy, Pollution, Stewardship

GRADE LEVEL 2nd

CONTENT AREA Science

UNIT AIR

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. To observe and compare the manner in which living things utilize air. (4).	CLASSROOM: 6. A. Do "Lesson Capsule" activities 1-2, pp. 20-21,TM B. View a film from those listed under resources for Objective 6. C. Explain the difference between the way man breathes and the way fish breathe. Explain that it is necessary to agitate water in an aquarium so that oxygen will continue to be dissolved and available for the fish to breathe. Plan and construct a classroom aquarium. SITE: 6. A. Review the terms breathe, lungs, gills, animals, plants, oxygen, carbon dioxide. Have students look for and list living things that obtain air through lungs, through gills. Have students look for living things that obtain air through other means (plants).	REGION X FILMS: Ocean of Air. MP 4043. Why Do We Need Air. MP 4033

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
7. To explain some of the causes and consequences of air pollution.	**CLASSROOM:** 7. A. Read and Discuss pp. 22-25. B. Do "Lesson Capsule" activities 2-3 p. 23 T.M. C. Individualized Extension Activity p. 4. (To compare and contrast the amount of invisible impurities collected from air in the immediate environment). D. Do the following activity: Objective: The students will be able to explain how automobiles pollute the air. Materials: Model cars, pictures of suburbia. Procedure: Discuss the ways automobiles destroy our ecology. Make a list of these on chart paper or the chalk board. Discuss what life would be like without automobiles. Supplemental Information : 1. 75% of all noise is made by automobiles. 2. 80% of the air pollution comes from automobiles using gasoline and oil. 3. Highways and streets destroy natural land. 4. Cars uproot residents. 5. Autos clog streets, highways, freeways, etc. 6. Automobiles kill thousands of people. (About 60,000 a year) 7. They injure millions every year (about 2-3 million)	Region X Films: Pollution MP 5003

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	Thought Question: 1. Is the automobile worth the problems it has caused? 2. Have you ever seen an abandoned car? What should be done about these? Results: Students will learn that automobiles pollute the ecology in many ways. Students will learn that automobiles have good points and bad points. Conclusion: Automobiles pollute the air. E. Do the following activity: Objective: The student will be able to explain and demonstrate how man is using up the oxygen in the air. Materials: Two quart jars with covers, candles, fireplace matches, watch with a second hand. Procedure: Place candle in quart jar, affix to bottom with dripping wax. Light the candle and quickly cover it. Record the amount of time it takes to go out. Blow out all gases. Light two matches deep in the jar without lighting the wick. Let them burn for several seconds. Light the candle and quickly cover it and record the amount of time it takes for the candle to go out. Discuss what happened to the candles and relate it to things in the environment that use oxygen to do work. (ex. automobiles, power plants)	

KEY CONCEPTS Energy, Pollution, Stewardship

GRADE LEVEL 2nd

CONTENT AREA Science

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

Supplemental Information:
1. While burning uses up oxygen, plants return oxygen to the air.
2. As our population grows and we need more land for buildings, streets, schools; ex. we dig up trees, bushes, weeds, and other plants that produce oxygen.

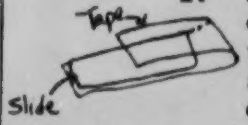
Thought Questions:
1. Are there any other good sources of oxygen?
2. What will happen if our oxygen supply is cut in half?
3. Can a runner run faster on a smoggy day or a clear day?

Results: The student is able to explain and demonstrate how oxygen is used up in the air.

Conclusion: Man is requiring and using up more oxygen producing sources in his environment.

CAMPUS/SITE:

7. A. Perform the following activity as a class:
Have students sample the air at different areas of the school classroom, and/or the environmental site for evidence of solid (particles) air pollution.
   1. Being very careful not to touch the surface of the tape, loop a piece of double-sided transparent tape over a clean glass microscope slide. Be sure to leave a loop at the end.

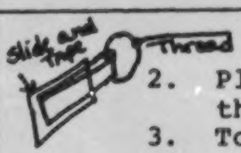
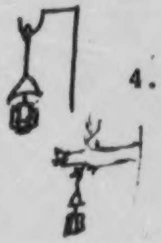


KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	 2. Place a thread through the loop in the tape so that slide may be hung from any object. 3. To protect the slide from rain, construct a cone from aluminum foil, slip it over the thread, and affix it so that it protects the slide but does not cover it.  4. Place slides in various sampling areas either by hanging them from objects or using coat hangers to make wire supporters. If your class is interested in testing the amount of air pollution in different locations, all slides should be placed on the same day and retreived on the same day. Five days is a good time span to collect pollutants. The slides should viewed under microscopes to classify the type of pollutants (soot, pollen, etc) and to rank the severity of pollution. Results might be plotted on a map and then possible reasons for areas of high pollution could be explored. B. Perform the following activity as a class to have students sample and compare different areas of the community for gaseous pollution. Using green beans, pinto beans, or petunias (select one) plant seeds in the classroom in potting soil in individual cups and care for until plants are 2-3 inches tall. Give two plants to each student to take home with care and location instructions for home sampling. Keep 3 control plants in the classroom. Have students return plants to school in 2 weeks. Rate the degree of damage and transfer rating system to a map that shows the sampling location of the plants. Decide which area offers the highest air pollution. What might be the reason for this?	

KEY CONCEPTS Energy, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 2nd

UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
8. To gain awareness of ways to reduce air pollution within the immediate environment and within the community.	CLASSROOM: 8. A. Do "Lesson Capsule" activity 2 p. 25 in T. M. B. Invite school custodian as guest speaker. C. Do "extension" activity p. 21 in T. M. D. Do "extension" activity p. 23 in T. M.	

KEY CONCEPTS Energy, Pollution, Stewardship
CONTENT AREA Science
GRADE LEVEL 2nd
UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM: E. Do "Lesson Capsule" activities 1-2 on p. 24 and 25. F. A very good little booklet, entitled "Fun with the Environment" can be ordered from the EPA, International Bank Building, 1201 Elm St., Dallas, Texas 75270. G. Discuss the questions on p. 27 using any of the "Lesson Capsule" a-tivities listed on p. 26. CAMPUS: Do "Extension" on p. 25.	

KEY CONCEPTS Energy, Pollution, Stewardship
GRADE LEVEL 2nd
CONTENT AREA Science
UNIT Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	4. Reduce your electricity, especially 5 to 7 p. m. (more electricity, more dams and power plants) 5. Do not waste water. 6. Give your papers to a recyling center. 7. Recycle glass and aluminum. 8. Compost or bury garbage. 9. Return wire coat hangers to the cleaners. 10. Don't buy over-packaged items. Results: The student is able to identify the kinds of pollution in his home and able to suggest means of reducing wastes. Conclusion: Many kinds of pollution may exist in the home environment. G. *Extension Activity p. 23, T. M. __CAMPUS:__ 8. A. Organize an ECOLOGY DAY. Plan activities to help clean up the campus and school building.	

KEY CONCEPTS Interaction, Pollution, Energy
Resource Distribution

CONTENT AREA Science

GRADE LEVEL 2

UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Explain that much of the earth's surface is covered with water, and that water is also present in the atmosphere. (4,5)	CLASSROOM: I. A. Do "Lesson Capsule" Activities 1-5 pg. 106-107. B. Explain Science Background on pg. 107. C. Do "Lesson Capsule" Activities 1-5 pg. 108-109. D. "Lesson Capsule" Activity #4 would make a good center or independent activity. E. View Film : Water for the City (MP1421) Region X.	Understanding Your Environment Silver Burdett pg. 106-1 Book: Birth of a Pond by John Hamberer Pond Life Alexander Crosby Follett Beginning Science Book Water Philip Carona Junior Science Book Book of Water Ottis Peterson

KEY CONCEPTS Interaction, Pollution, Energy Resource Distrubution
GRADE LEVEL 2
CONTENT AREA Science
UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To observe water in the solid, liquid and gaseous states and to describe how water changes from one state to another. (1)	2. A. Do "Lesson Capsule" Activities 1-2 pp. 110-111. B. Do "Extension" #2 in p. 111. C. Do "Lesson Capsule" Activities 1-4 pp. 112-113. D. Explain Science background p. 113.	

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

GRADE LEVEL 2

CONTENT AREA Science

UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To demonstrate how water evaporates and is released as rain. (1)	3. A. Read and Discuss pp. 114-115. B. Do "Lesson Capsule" Activities 1-4 Activities 3 and 4 would make good centers. See p.T11 for more directions on making a terrarium. C. View a film from those listed under resources for objective 3. CAMPUS: 3. Take students on a walk around school grounds to observe components of the water cycle. SITE: 3. Look for components of the water cycle on the site.	3. Films: Clouds (MP1417) Terrarium, The Classroom Science (4486) Drop of Water (4919) Finding Out About Ou Water Cycle

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

CONTENT AREA Science

GRADE LEVEL 2

UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To observe ways in which solid substances dissolve in water. (4,5)	CLASSROOM: 4. A. Do "Lesson Capsule" Activities 1-2 pp. 116-117. B. Explain "Science Background" p. 117. C. Read and do activities suggested on pp. 118-119.	

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution
CONTENT AREA Science
GRADE LEVEL 2
UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. To observe ways in which water changes the earth's surface. (5)	See below	

CLASSROOM:

5. A. Do "Lesson Capsule" Activities 1-2 pp. 120-121.

B. **Objective:** The students will be able to identify some soils and demonstrate how some are better than others for holding water.
Materials: Four clay flower pots (same size); four glass jars, with mouths big enough for the flower pots to be set in; clay, silt, sand and humus; measuring cup; and water.
Procedure: Place each type of soil in one flower pot. Place flower pots in the glass jars. Pour equal amounts of water into each flower pot. Observe the amount of water that runs off each pot, the amount of dirt carried through with the water and the length of time for the water to seep through. Discuss how soil with vegetation will hold water longer and tend to prevent erosion.
Results: The student will observe that there is little or no run-off with the humus. With clay, little soil is washed off. Some sand is carried off. Silt is washed away in great quantities.
Conclusion: Some soils are better than others for holding water.

CAMPUS:

5. Take the class for a short walk on a day after it has rained. Be sure to visit places which are covered with grass and plants, then see places where the soil is bare. Compare the two locations by asking the following questions.
   1. What happened to the sloping land with plants? (Did not wash away.)
   2. What happened to the sloping land where there were no plants? (eroded-washed down the slope, small gullies)

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

CONTENT AREA Science

GRADE LEVEL 2

UNIT Water (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 5. Through discussion establish that the plants were helped by holding the soil. They do this by slowing down the flowing water.	

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution
GRADE LEVEL 2
CONTENT AREA Science
UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. To recognize that water is essential for all living things. (4,5)	CLASSROOM: 6. A. Do "Lesson Capsule" Activities 1-3 pp. 122-123. B. See Spice Book "ECO" "Elementary Science Discovering Water uses in Nature" #7 p. 45.	Deserts Delia Goetz Desert Dwellers Terry Shannon All About the Desert Sam and Beryl Epstein

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution
GRADE LEVEL 2
CONTENT AREA Science
UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
7. To compare those living things that live in water with those that live on land. (5)	CLASSROOM: 7. A. Read and discuss pp. 124-127. Do "Lesson Capsule" Activities 1-2. B. Have children collect and sort pictures of animals that live on land and water. C. View a film from those listed under resources for objective 7.	7. Visit Aquarium at Fair Park call 428-1123 for reservations. Books: The Bottom of the Sea Augusta Goldin World Beneath the Sea National Geographic Society Houses From the Sea Alice E. Goridey Junior Science Book of Sea Shells Sam and Beryl Epstein Journey of the Gray Whales Gladys Conklin Films Exploring the Ocean MP1436 We Explore Ocean Life MP1059

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

CONTENT AREA Science

GRADE LEVEL 2

UNIT Water

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
8. Explain some of the causes and consequences of water pollution. (4,6)	CLASSROOM 8. A. As introduction place a sign saying DO NOT DRINK-THIS WATER IS POLLUTED. Get the childrens reactions to this sign; where they may have seen this before, why is it important? How it could affect us. B. Do "Lesson Capsule" Activities 1-3 pg. 128. C. Objective: The student will demonstrate how our oceans are becoming polluted. Materials: Paper, tin cans, oil, food coloring, hot plate, pan, water, big dish pan, pieces of glass. Procedure: Tell the class that the dish pan will represent the ocean. Heat pan of water on hot plate. While this is being done, throw papers in the dish pan and tell class this represents all the paper people throw in streams, rivers and in the ocean. Throw in a few tin cans. Toss in some pieces of glass. This represents broken bottles, crockery, dishes, that people toss in the ocean. Add some food coloring. This represents industrial chemicals, sewage disposal, etc. Add the hot water. This represents atomic wastes. Ask the class if they would like to swim in this "ocean". Ask class if they think fish can live in this "ocean". The water in the dish pan becomes dirtier and dirtier and more and more polluted. Students will realize that everybody adds to air pollution. Conclusion: Our oceans are becoming polluted.	Junior Science Book of Water Experiments Rocco V. Feravolo

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

CONTENT AREA Science

GRADE LEVEL 2

UNIT Water (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM:	Environmental Guide, Green Bay, Wisconsin

CLASSROOM:

8. D. Divide the class into two groups, "We care" and "We Don't Care". The "We Care" group changes the water in their fish bowl everyday. The "We Don't Care" group does not change their water, instead they may add oil, fertilizer, detergent soil, salt, sugar, food coloring etc. They should keep a record of the elements introduced in the other fish bowl. They should observe the murkiness and foul odor in the air. Discuss what would happen if fish lived in each fish bowl.

   E. Examine drops of polluted water under a microscope or magnifying glass, discuss what they see.

   F. Do "Lesson Capsule" Activity #4 p. 129.

SITE:

8. Children should visit the stream at the site to look for evidence of pollution. Gather samples of the water to use in experiment E.

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution

CONTENT AREA Science

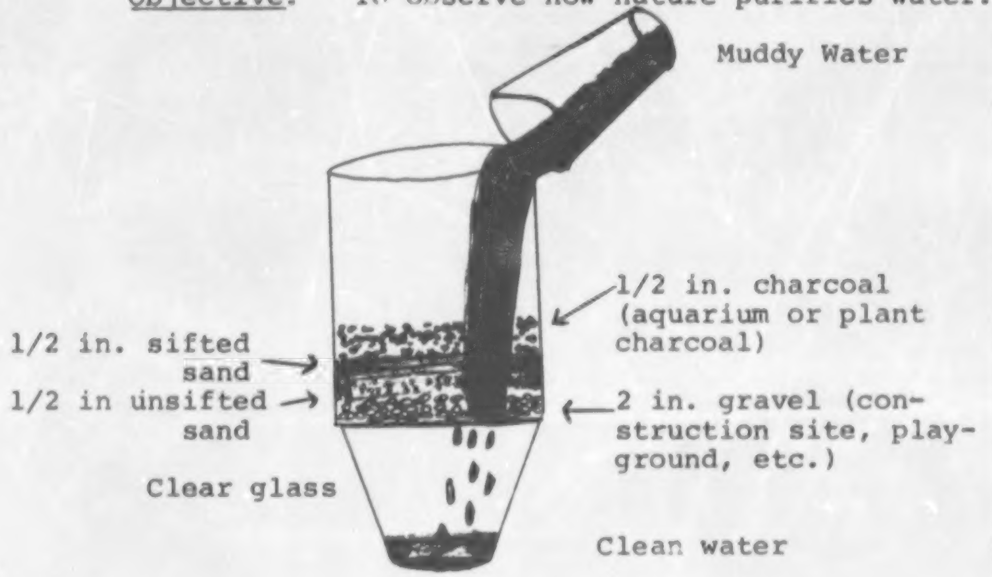
GRADE LEVEL 2

UNIT Water (p. 3)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

CLASSROOM:

8. G. Materials: coffee or large juice can
Objective: To observe how nature purifies water.


Muddy Water
1/2 in. charcoal (aquarium or plant charcoal)
1/2 in. sifted sand
1/2 in unsifted sand
2 in. gravel (construction site, playground, etc.)
Clear glass
Clean water

CAMPUS:

8. Procedure: The students will observe how nature purifies water. Punch six or eight hole's in the bottom of the can. Layer the gravel, sand, and charcoal in the amounts shown in the illustration. Put the can on the drinking glass. Pour muddy water into the can. Save some for comparison.

SITE:

8. Results: The students observes the muddy water draining through the filter, leaving foreign particles behind and coming out clear.
Conclusion Filtration is nature's way of purifying water.

KEY CONCEPTS Interaction, Pollution, Energy Resource Distribution
CONTENT AREA Science
GRADE LEVEL 2
UNIT Water (p. 4)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM: 8. H. Discuss questions on p. 131. I. Use any activity in Extension 1, p. 131 as a culminating activity.	

KEY CONCEPTS Interaction

GRADE LEVEL 3

CONTENT AREA Science

UNIT The Changing Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To describe examples of the ways the earth is changing. (5, 6) 2. To demonstrate an understanding of the three main parts of the solid earth. To describe changes in the earth that result in volcanoes, geysers stalactites, and stalagmites (5) 3. To compare rock particles and to group rocks by similarity of texture and hardness. (5) To use observations of the environment in predicting ways rocks may have been formed. (5)	CLASSROOM: 1. A. Do "Lesson Capsule" Activities 1-3 in SB T.M., pp. 30-31. B. Read and discuss, p. 31. 2. A. pp.32-35 in SB, Read and discuss. B. "Lesson Capsule" Activities #1,2,3,4,5,&6 C. Do extension activity in TM, p. 34. D. View film ____________ from Region X. 3. A. Read and discuss pp. 35-44. B. "Lesson Capsule" Activities 6-12, T.M. 38-44. C. Have students who collect rocks bring their collections to compare rocks and to study those rocks not native to this area. 4. A. Do "Lesson Capsule" Activities 1-2 in SB T.M., p. 45. B. Read and discuss pp. 45-46. 5. A. Read and discuss pp. 47-49. B. Do "Lesson Capsule" Activities 2 and 3, SB T.M., p. 48. C. Do Activities 5 and 6 in SB, page 50-51. 6. A. Read and discuss SB, pp. 52-55. B. Form committies to explore questions in "Lesson Capsule" #1, p. 53. Also do "Lesson Capsule" Activities 2-5. CAMPUS: 1. Have students observe and record changes which have taken place on the school campus since it was built or since they were there. (New trees, shrubs, grass) What caused the changes? How have the changes affected the school environment? Look at changes in the earth's surface due to residential development.	Understanding Your Environment, Silver Burdett, Grade 3, Region X Film. Filmstrips: Mp 4832. #1.

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 3

UNIT The Changing Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
To describe and illustrate the role of water in breaking down rocks and forming soil. 4. To describe ways in which wind effects the earth's surface. To describe ways in which wind damage can be prevented or controlled. 5. To describe the relationship of plant growth, erosion and the way soil is formed. To compare soil from different places to determine their ability to hold water and their fertility.	3. Have students collect 2 small rocks from the campus. Have tht students sort the rocks and group them by different textures. To help determine texture, the students might want to rub rocks with a metal file and compare the particles with a magnifying glass. Do "Learner Capsule" Activity 2, T.M. p. 37. 4. Look for evidence of wind erosion. #3 SITE: 1. Observe changes at the site which man has influenced bulldozed tree path for sewer line, wild flowers brought back by man. 3. A. Collect samples of rock. Look for clues which indicate possible ways rocks at the site were formed. B. Include these observation experiences: Use clear plastic containers to collect water that is running in the stream and/or in the woods. If the debris has had a chance to settle stir it vigorously. C. Look for evidence of erosion and the force of rapidly moving water. Whenever possible, have students draw their observations. D. Walk along the creek where the water has worn away the earth, exposing the layers of soil rock. Have students draw the layers and collect samples of the materials in each layer. E. Collect rocks that look like they were formed in layers. Have students compare thickness, texture, and color of layers. F. Take pictures of the creek bank for further classroom study of soil layers. 4. Observe and illustrate the layers of soil along the creek bank. #1	

KEY CONCEPTS Interaction

GRADE LEVEL 3

CONTENT AREA Science

UNIT The Changing Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. To recognize that fossils give evidence of kinds of plants and animals that once lived on the earth.	**ENRICHMENT:** 1. Make a model of a volcano. #2 2. Make a chart using rock collections brought from home, showing their similarities and differences.	

KEY CONCEPTS Interaction, Interdependence, Plants

CONTENT AREA Science

GRADE LEVEL 3

UNIT The Plant World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. List ways man uses some plants. (2,6) 2. Detect the presence of chlorophyll and describe the importance. (1) 3. Describe how water passes into, through and out of plants. 4. Identify differences and similarities among green plants. (3) 5. Compare and contrast the structure of non-green plants and tell how they are useful. (3,2)	CLASSROOM: 1. A. Describe or illustrate objects in the room that are made from plants. B. Use of microscope - examine water samples. Describe and illustrate them. C. Activity #3, T.M. p. 59. 3. A. Observe and explain that plants come in various sizes. B. Experiment T.M., p. 63. C. Activity #9, T.M., p. 69. D. Lesson Capsule #1, T.M., p. 74. E. Place celery stems in colored water and observe for one day. Notice how the water travels up and into the plant. 5. A. Draw a flower and have students label the parts. B. Show relationships of parts to whole. C. Demonstrate the importance of decomposition. 6. Grow seeds in a plastic bag with a damp tissue and staple it to the bulletin board. Examine, compare and record the day to day process. 7. Activity #10, T.M., p. 73. 8. A. Lesson Capsule #1, T.M., p. 70. B. Lesson Capsule #2, T.M., p. 71. C. Lesson Capsule #3, T.M., p. 71. CAMPUS: 4. A. Find the smallest plant in the area; examine with a microscope. Describe and illustrate. B. Examine and compare the root systems of several small plants. C. Using identical plants, place one in a plastic bag and one in sunlight. Compare their growth after several days.	Science - Understanding Your Environment, Silver Burdett. Region X Films: MP 4289 - #3 obj. MP 1058 - #4 obj. MP 1157 - #4 obj. MP 1056 - #6 obj. MP 1060 - #1 obj. MP 1708 - #7 obj. MP 1736 - #6 obj. National Geographic filmstrips available at Christie: 581.1 "The Parts of a Plant" (#5) 581.1 "How Plants Grow"(#6) 581 "Kinds of Plants" (#4) 581.9"Where Plants Grow(#6) 581.6"Plants and People(#1)

KEY CONCEPTS Interaction, Interdependence, Plants
CONTENT AREA Science
GRADE LEVEL 3
UNIT The Plant World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. Compare environments of plants and discover how the type of environment affects plant growth. (2,3) 7. Recognize and compare the usefulness of green and non-green plants. (3) 8. Examine the structures of mushrooms, mold and yeast. (1)	SITE: 1. Identify three on-sight plants and illustrate. Under each, show an example of its product and/or its use in the environment. 2. Collect a few green plants. Rub on white paper to determine presence of chlorophyll. 4. Identify a bluebonnet, oak tree, and other native plants. 5. Identify leaves from 10 trees and make prints of them. 6. A. Photograph 10 plants and place on a bulletin board. Compose stories describing each picture. B. Explore "A Changing Forest" (living and dead plants). Explain what changes have taken place and why. C. Divide a sheet of paper into six blocks. ENRICHMENT ACTIVITIES: 1. Make a collection of plant roots. Classify and label each one describing its use and purpose. 2. Determine which plants contain oil. Rub the following on a piece of brown paper: a peanut, an orange peel or a lemon peel. Shiny spots indicate plants containing oil. 3. Plant one bean in each of six small flower pots. Give fertilizer to three of the plants and none to the others. Give all plants equal amounts of light, warmth and water. Compare growth of plants that were fed fertilizer and those that were not. 4. The Upside-Down Potato: Purpose: To motivate students to study plants, to promote the concept that plants grow from roots. Materials: 2 sweet potatoes, 2 identical jars, water.	Science For the Elementary School, MacMillan.

KEY CONCEPTS Interaction, Interdependence, Plants

CONTENT AREA Science

GRADE LEVEL 3

UNIT The Plant World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	Procedure: Fill 2 jars with water and put the sweet potatoes in them. Leave the tops of the sweet potatoes out of the water. Plant one upside-down. Upside-down is slower to root but eventually the roots and the leaves will go the right direction - even though the leaves are tender and must pass out from under the heavy potato. 5. You will need 1/2 teaspoon of dried yeast, a cup of flour, some warm water, 2 small mixing bowls, and a spoon. Put 5 teaspoons of warm water into each of the bowls. Stir the dried yeast into one of the bowls until the water becomes milky. Add 1/2 cup of flour, a little at a time, to each of the bowls. Mix thoroughly until a ball of dough is formed in each bowl. Let the 2 balls of dough stand. Observe them every 15 minutes. At the end of 2 hours, what do you observe? Why did you make 2 balls of dough?	

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To identify water as the most abundant resource on Earth. (4,5) To formulate that all living things need a clean, fresh supply of water. (4)	CLASSROOM: I. A. Read and discuss p. 51 in S.B. text and relate "Science Background" on p.51 in TM. B. Do "Lesson Capsule" activities 1-4 in S.B. C. Do investigation 1 on p. 59 of S.B. text. D. Plant two bean seeds in separate containers. Give equal care until 4 or 5 inches high. Discontinue watering one plant. Discuss results. E. Weigh large apple and potato. Record weights. Allow each to dry out (Slicing and/or baking will speed process). Weigh after drying. Record and compare to original weight. Discuss what is missing with emphasis on prevalence of water throughout the environment. F. Visit the nearest water supply plant and/or sewage treatment plant. G. To show how little of the earth's water is suitable for drinking, cut an apple into quarters: 1/4 is land, 1/2 is salty oceans, etc. of the remaining 1/4 slice off pieces for ditches, marshes, swamps, etc. until 1 tiny slice remains for drinking. Eat that slice. Ask students what would happen if all the water disappeared. H. View films from Region X and/or available filmstrips. I. To show necessity of clean water, fill one container with fresh water and one with polluted. Place minnows in each one. Feed and care for each one identically. Record and discuss results.	Science: Understanding Your Environment Silver Burdett, Grade 4 Region X Films 1. MP4016 Simple Demonstrations With Water Resource Material available from: Water Quality Board 1700 N. Congress Austin, Texas 78701 Filmstrips: 1. Water, Water Everywhere Filmstrip House 2. Water Conservation Today SVE Books: 1. Morgon, Aquarium Book for Boys And Girls, Scribner. 2. Yashima, Seashore Story, Viking.

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Water on the Earth (P.2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: 1. A. After collecting water samples from campus creek make an experimental water filter by fitting a one hole stopper with a short length of glass tube into the small end of a lamp chimney. Put a little cotton wool in the bottom and then a layer of small clean pebbles. Wash some coarse sand well and place a layer above the pebbles. Next wash some fine sand and make a thicker layer in the filter. Grind up some wood charcoal and make a paste with water. Pour the charcoal paste evenly over the surface of the sand. Get some muddy water and pour in the top of the filter. Collect the filtered water in a clean glass placed under the glass tube. Discuss importance in terms of the need for a fresh, clean supply of water. (May be repeated using water taken from site). B. Collect water samples from creek, etc. and filter through filter paper and label. After these filter papers have dried examine each in a microscope. SITE: 1. A. Do Campus Activity 1A using site water.	3. Barlowe, Oceans, Follett. 4. Adler, Rivers, Day. 5. Bauer, Riches or Ruin, Doubleday. 6. Buehr, Our Vital Need, Grossett and Dunlap. 7. Peterson, Water, Gerrard. 8. Smith, The First Book of Water, Watts.

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To describe the water cycle and the water table and recognize their influence upon our environment. (1,4)	CLASSROOM: 2. A. Do "Lesson Capsule" activities 1-5 in S.B. TM pp. 57-58. B. Demonstrate the water cycle in miniature. Place a box of plant seedlings on a table. Place a metal tray about 35-40 cm. above the box of seedlings. Place pieces of cracked ice in the tray. Place a tea kettle or flask containing water over a source of heat so that steam will pass between the seedling and the tray. The flask serves as the earth's source of water. This evaporates and rises up to the cool tray which represents the upper layers of the air above the earth which have been cooled by expansion. Here the moisture condenses on the tray and drips back on to the seedlings as rain. C. Do Investigation 2 on p. 59 of S.B. text. D. View Region X film and/or available filmstrips.	Region X Film: 1. MP4040 "Finding Out About the Water Cycle" Filmstrips: 1. Water: Nature's Water Cycle

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To recognize water as the greatest solvent. (4) To describe the many uses of water. (5,6)	CLASSROOM: 3. A. Do "Lesson Capsule" activities 1-4 in S.B. TM pp. 60-62. B. To illustrate water's power as a solvent, dissolve small quantities of sugar, salt, and/or soda in hot water. Compare the rates at which solution takes place in other liquids such as oil, vinegar, milk, alcohol, and kerosene. C. Have students bring articles and pictures dealing with uses of water. Use to make a bulletin board. D. View Region X films and/or available filmstrips. CAMPUS: 3. A. Collect pebbles from Campus and randomly sort equally into two jars. Roughly shake jar "A" at least 1000 times. Do not shake jar "B" at all. Compare water and pebbles from each. Discuss. B. Test the ability of water to do work by making a water turbine. To make a water turbine punch hole in the center of tin can top. With a pencil divide the top into eight equal sections. Use tin snips to cut each line to about one-half inch from the hole in the center. Then twist each section with pliers to form blades that are almost at a right angle with the flat part of the top. Attach top to dowel rod and secure with hat pin. (A knitting needle can be used instead of the dowel rod and hat pin.) Place turbine in flowing creek and observe. Then attach rubber tubing to faucet and pinch the end	Region X Film: 1. MP4047 "Wise Use of Water Resources." 2. MP1274 "Conserving Our Water Resources Today." Filmstrips: 1. Some Things Dissolve, McGraw-Hill. 2. Water and Its Work, McGraw-Hill. 3. Water Pressure at Work, McGraw-Hill.

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Water on the Earth (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	of the rubber tubing so that a narrow, fast stream of water comes out of the tubing. Direct this stream of water against the blades of the water turbine. Compare results. (This activity may be done on site also.) **SITE:** 3. A. Take a nature walk along Rowlett Creek at site noting all evidences of erosion. Discuss causes and possible solutions. B. To determine if all moving water carries the same amounts of sediment, take three bottles and lable: Wooded Area Pasture Creek Bank after a heavy rain take a sample of water from each of the three areas, allow the samples to settle for a few days and discuss results.	

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To recognize the properties of a water habitat. (2,3) To compare and contrast fresh and salt water habitats and the organisms adapted to each. (2,3)	CLASSROOM: 4. A. Do "Lesson Capsules" 1-4,pp. 68-69 in TM. B. Read and discuss pp. 69-73. C. Do "Lesson Capsule" 1,p. 71 in TM. D. Have students research selected animals and/or plants that live in water. (Be sure the Pacific salmon and the eel are included as they are adapted to both fresh and salt water.) E. Do "Investigation 7" on pp. 74 and 75 in S.B. F. Do number 3 of "Review with Investigations" on p. 79 in textbook. G. Collect various shells; some from salt and some from fresh water. Compare similarities and differences. Discuss. H. Test the buoyancy of water by obtaining a can with a tightly fitting cover (coffee can). Fill the can with water and put the cover on. Put a double loop of string around the side of the can and then attach a large rubber band to the other end of the card. Lift the can by the rubber band to see how much the band stretches Now lower the can in a pail of water and again lift the can by the rubber band and observe the difference in the amount of stretch. Have the children explain. I. Create mural entitled "The Death of a River" illustrating the many ways a river can die. Discuss effects of this death on living organisms. J. Contact the Dallas Aquarium for possible resource persons and/or materials. K. To determine whether salt or fresh water has more buoyancy. Fill 2 glasses with water within an inch of the top. Add six or seven table-spoons of table salt to one glass. Stir the	Region X Films: 1. MP4175 "The Earth: Its Oceans" 2. MP4227 "Fresh Water Pond" Resource persons, films, and material available from: Dallas Aquarium

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	water until the salt is dissolved. Place one egg in each glass of water. L. View films from Region X. M. Set up aquariums in classroom and observe. If possible set up a fresh water aquarium and a salt water so that comparisons might be made. CAMPUS: 4. A. In quart jars take water samples from campus and site locations. View samples under microscope then put dry grass or straw in the jars and allow to set for two weeks in a dark area with the lids off. Prepare slides from each sample. Observe and discuss differences and similarities in microscopic life that has developed. B. Take a sample of creek water and study microorganisms under microscope. Students may sketch what they see for future reference. SITE: 4. A. Repeat Campus Activity 4B using water from Rowlett Creek or site. Compare contents of site water with that of the campus sample. B. Compare the plant life at opposite ends of the creek. (photographs could be taken at each end.) Discuss similarities and difference. Attempt to find explanations for differences.	

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth (p. 3)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	C. Take a nature walk along the creek bed observing and recording any or all of the following things: 1. animal life 2. insect life 3. plant life 4. creek depth at various locations 5. water temperature at various locations and depths. 6. obvious waterside habitats 7. evidences of erosion 8. soil variation 9. dampness level of creek bank 10. rate of water flow at various locations and at varying distances from bank at each location. Before beginning each student could be provided a simple map of the creek so that observations could be recorded where found. Samples from various pre-determined locations could be taken back to the classroom for further study.	

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. To illustrate an understanding of the food web by tracing a chain. (1,2,3)	CLASSROOM: 5. A. Read pp. 76-78 in textbook. B. Discuss "Lesson Capsule" activities 1-4 on pp. 76-77 in TM. C. Do "Extension" on p. 77 in TM. D. Do number 2 of "Review with Investigations" on p. 79 in textbook. E. Food Web Illustration on next page. CAMPUS: 5. A. Take a nature walk through the campus. List any and all preditors seen. B. After thorough study during walk, discuss all food webs that could exist in such an environment. SITE: 5. A. Do Campus Activity 5A and compare with findings on campus. B. Do Campus Activity 5B and compare with those established for campus.	

E. Food Web Illustration

Procedure:

a. Make a list of all the living things in your environment. Include animals that used to live there before people crowded them out.

b. Choose a spot on your paper at random and write or illustrate one animal from your list.

c. Write or draw on the paper something which depends on that animal or which the animal eats elsewhere connect these with a string. Use the pins or tacks to secure your string at the ends. You will probably have some foods connected to several animals.

d. Now picture another animal which eats or is eaten by one of the first two and connect them with pins and string. (see figure 1)

e. Continue placing words or pictures at random until you've used all the items on your list. (see figure 2)

f. Carefully remove one of the animals from your foot web. The strings will be disconnected. That means that the animals at the other ends of the strings have to look for other kinds of food to survive. Remove any animals that cannot survive. Continue until there are no disconnected strings.

3. Results: As the strings are removed the food web is broken down.
4. Conclusion: The students see the importance of all living things to the food web.

Going Further

Make another food web using another environment (desert, ocean, jungle, lake, mountain tops or even city sewers).

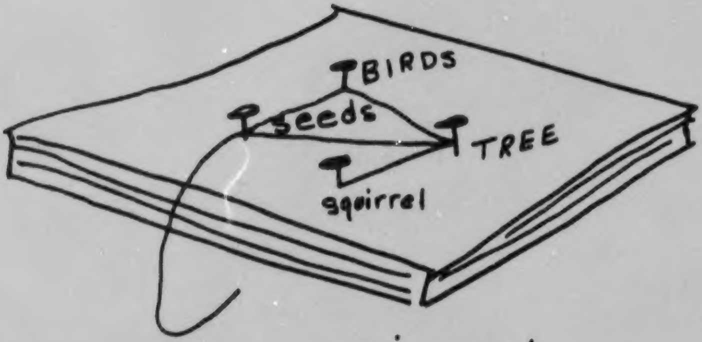


Figure 1

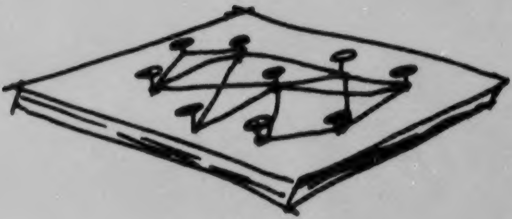


Figure 2

KEY CONCEPTS Energy, Interdependence, Balance of Nature Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Water on the Earth

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ENRICHMENT: 1. Nitrate Water Activities - pamphlet explaining nitrate as a water pollutant and methods of testing for it; available from: Science Study Aids, Information Division Agricultural Research Service, USDA Washington, D.C. 20250 2. Making a 3-D Model Using a U.S.G.S. Topographic Map - pamphlet describing how to make a topographical map; available from Plano Environment Coordinator or: Ecos Training Institute 833 Fox Meadow Road Yorktown Heights, N.Y. 10598 3. Rowlett Creek Research Project - Students could study the creek in depth identifying its source, mouth, total path, etc, A history of the creek could also be compiled (settlement development along its banks, floods, etc.).	

KEY CONCEPTS Interaction, Pollution, Stewardship
CONTENT AREA Science
GRADE LEVEL 4
UNIT Using the Atmosphere

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To evaluate the necessity of air to all living things. (2, 4)	CLASSROOM: 1. A. Read and discuss p. 27 in the S.B. textbook. B. Do the "Lesson Capsule" Activities on p. 26 in S.B. TM. C. Have students count breaths taken in one minute. Compute the average breaths of the class in an hour, a day. Next have students sit quietly for 3 minutes. Then tell them that if there had been no air for those minutes, they would all be dead. D. Draw and label the layers of the atmosphere and discuss how man would react to the decreasing air as the altitude increases with each layer. E. Compare the atmosphere of the moon to that of the earth and how each affects man. F. Write creative stories on how all living things might change if the atmosphere suddenly changed. G. OZONE THEORY LESSON - SEE RESOURCES. H. View Region X films and/or available filmstrips. CAMPUS: I. A. Find three weeds growing together on campus. Coat one completely with vaseline; one partially; and leave one as is. Observe daily, comparing the three weeds. Discuss results. "What implication is there for dust covered house plants?" SITE: I. A. On the site use native plants to test for air pollution. The best native plants are lichens, since they are highly sensitive to air pollution	Science: Understanding Your Environment, Silver Burdett Grade 4 REGION X FILMS: 1. MP4043 - The Ocean Of Air 2. MP1143 - Simple Demonstrations With Air 3. MP1365 - Air All Around Us 4. MP1416 - Air, A First Film REGION X- Two Week Loan Project E.S.P. Educational Personnel Development Consortium D P.O. Box 1300 Richardson, TX 75080 ER9 Ozone Theory Lesson Plan ER82 U.S. Dept. of Agr. Science Study Aids #5 Testing Air Pollution

KEY CONCEPTS Interaction, Pollution, Stewardship
CONTENT AREA Science
GRADE LEVEL 4
UNIT Using the Atmosphere (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: (Continued) levels. Look for the diversity or numbers of different kinds of lichens in the site. In areas of high air pollution, you will find few types of lichens, while in clean air there will be many different kinds. Assign different areas of the site, campus, and/or home to each student to look for lichens. Plot these numbers on a map and discuss results. Areas with low numbers indicate highest air pollutants.	

KEY CONCEPTS Interaction, Pollution, Stewardship
CONTENT AREA Science
GRADE LEVEL 4
UNIT Using the Atmosphere

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To identify the component of the atmosphere. (4)	CLASSROOM: 2. A. Do the "Lesson Capsule" on p. 28 of S.B. TM. B. Read p. 29-33 in textbook. C. Do the "Lesson Capsule" on pp. 30 and 33 of S.B. TM. D. Perform "Investigation 1" on p. 32 of textbook. E. Research each of the gases within the atmosphere and discuss the importance of each to the quality of life on earth. F. Light a flashlight in a dark room to observe the dust particles in the air. G. Do "Investigation 2" on p. 34 of the textbook. H. Create carbon dioxide (1 t. baking soda and 4 t. vinegar) and put lighted match into it. Discuss what happens. I. Attach Kleenex to vaccuum hose. Turn vaccuum on. Compare that Kleenex to a new one. J. View Region X films and/or available filmstrips. CAMPUS: 2. A. Do number 2 from "Review" with Investigations on p. 37 of the textbook. B. Determine gaseous pollution. Check the condition of various constructions around the campus for weathering (Buildings, sidewalks, streets, etc.) Test rainwaters for pH (measure of acidity or alkalinity). Is pH acidic and/or constructions atypically weathered? Acidic rain causes damage to certain rocks. Acidic gases come from combustion. Discuss causes of gaseous pollution in air and rain water. C. Dig a single clover plant from the campus or site. Be careful to get as many roots as possible. Look carefully for nodules on the roots. These are white and about the size	

KEY CONCEPTS Interaction, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 4

UNIT Using the Atmosphere (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	of a pinhead. Inside these nodules contain special kinds of bacteria. The bacteria is able to fix nitrogen so that the clover and other plants can make use of it. This activity should be prefaced with a discussion of the nitrogen cycle. SITE: 2. A. Repeat Campus activity 2C on Site.	

KEY CONCEPTS Interaction, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 4

UNIT Using the Atmosphere

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To list various causes of and to formulate possible solutions for air pollution. (2,3,4,6)	CLASSROOM: 3. A. Read pp. 35-36 in the textbook. B. Do the "Lesson Capsules" on p. 35 of S.B. TM. C. Draw an outline map of Plano. As the students discover sources of air pollution, shade in the area on the outline map. D. Identify organizations working on air pollution problems and have students write for information. E. Uncork bottles of aromatic chemicals. Have students raise hands when they detect the odor. Discuss how students would feel if an odor producing factory was located near their home. F. Produce smog by dropping a burning match into a clear bottle and then blowing hard into the bottle. (Smog is combination of water vapor and smoke). Discuss city smog. G. Discuss what each student might do at home to help air pollution. H. View Region X films and/or available filmstrips. CAMPUS: 3. A. Explore the campus for visible evidence of air pollution. Identify and discuss possible causes and solutions. B. Thoroughly clean an outside window. Check daily and discuss results and reasons. C. Use vaseline cards to check exhaust of 5 cars on school parking lot. Lable each card with make, model, and year of the car and place a few inches from the exhaust pipe of running car. Make slides from these and study under a microscope.	Region X film: 1. MP4415 To Clear The Air Kits: 1. Air Pollution Kit (Practical Drawing) 2. Air Pollution Workshop (2 weeks, from Respiratory Health Assoc.)

KEY CONCEPTS Interaction Pollution , Stewardship.

GRADE LEVEL 4

CONTENT AREA Science

UNIT Using the Atmosphere (p.2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	D. Place 3 vaseline coated cards in 3 locations on campus. Compare results after a few days. Note plant life between pollution collected on cards and amount and condition of plant life. **SITE:** 3. A. While taking a nature walk through site, look for any evidences of air pollution. Discuss causes and possible solutions.	

KEY CONCEPTS Interaction, Pollution, Stewardship

CONTENT AREA Science

GRADE LEVEL 4

UNIT Using the Atmosphere

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ENRICHMENT: 1. After completing Classroom Activity 3C, more capable students might identify major offenders and formulate corrective measures. They could then present their findings and suggestions to a city council member and/or representative of involved companies. 2. Simulation games provide an open-ended activity for students to discover the principles governing a given situation. Steps in designing simulation games and possible simulations are available from the curriculum director and/or: Ecos Training Institute 833 Fox Measow Road Yorktown Heights, N.Y. 10598 914-245-6919	

KEY CONCEPTS Interaction, Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Weather, Climate, and Life

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To distinguish between the concepts of weather and climate. (1)	CLASSROOM: I. A. Discuss "Lesson Capsules" 1-3 on p. 215 of S.B. TM. B. Read and discuss p. 215 in textbook. C. Keep a class day-to-day weather calendar. Use the U.S. Weather Bureau symbols. D. Write the Superintendent of Documents, U.S. Printing Office, Washington 25, D.C. to obtain copies of daily weather maps. E. Investigation No. 3, p. 197, S.B. F. Discuss the various climatic regions (artic, tropical, etc.) G. Visit a weather station. H. Draw the globe and chart off and label the wind belts. I. Research to find the possible careers in meteorology. Choose the most appealing and write a report explaining what training it requires and describe the type of work done. (This may be extended to giving puppet plays, etc. to explain the work.) J. Find out what these early meteorologists contributed to weather knowledge: a. Urbain Leverrier b. Jakob Bjerkner c. Francis Reichelderfer d. John Lining e. Bernard Vonnegut f. Vincent Schaefer g. Robert M. White h. Benjamin Franklin K. Collect pictures of unusual weather conditions or unusual happenings that were influenced by the weather, and determine their causes. L. View films from Region X and/or available filmstrips and kits.	Science: Understanding Your Environment, Silver Burdett, Grade 4 Region X Films: 1. MP4041 Inside The Weather. 13 m. I-J 2. MP1174 Let's Learn To Predict The Weather. 11 m. I-J 3. MP4046 Weather Scientists. 13 m. I-J 4. MP7069 The Great Weather Mystery. 27 m. I-J 5. MP4657 What Makes Clouds? 19 m. I-J-H 6. MP1284 Weather: Understanding Precipitation. 11 m. I-J 7. MP1286 Weather: Why It Changes. 11 m. I-J 8. MP1190 Climates of the U.S. 11 m. I-J

KEY CONCEPTS Interaction, Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Weather, Climate, and Life (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: I. A. Construct a weather station. Include: (1) Thermometer, (2) Rain Gauge, (3) Wind Vane, (4) Anemometer (extension activity, S.B., T-208), (5) Hygrometer (extension activity, S.B., T-211), and (6) Barometer (extension activity, S.B., T-192). B. Do investigation 3, p. 226, of S.B.	9. MP1109 Climates of the U.S. BELL TELEPHONE CO. Our Mr. Sun and The Unchained Goddess

KEY CONCEPTS Interaction, Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Weather, Climate, and Life

OBJECTIVES

2. To describe the effect of weather, climate, and seasons on living organisms. (1, 2, 3)

LEARNER ACTIVITIES

CLASSROOM:

2. A. Discuss "Lesson Capsules" 1-5 on pp. 218-219 of S.B. TM.
   B. Read and discuss pp. 218-224 in S.B.
   C. Do investigations 1-2, p. 225 of S.B.
   D. Make a scrapbook of pictures of games and sports that are played in warm weather and cold weather.
   E. List five industries that are helped by each of the following: rain, snow, hot weather and cold weather. List five that are hurt.
   F. Do extension activity p. 224, S.B.
   G. Write a creative story pretending to be an animal. Tell how the animal feels going through seasonal changes.
   H. Collect information about "man-made weather" (seeding clouds, rain dances, etc.). How is each done? Is it effective?
   I. Trace a U.S. or Texas map. Illustrate on it the average annual amount of one of the following: precipitation, temperature, or relative humidity.
   J. Determine the effect of weather conditions on human beings. (Is temperature the only factor making it cold?)
   K. View films and/or filmstrips from Region X.

CAMPUS:

2. A. Plant a tree. Observe appropriate planting time during the year.
   B. Select one plant on the campus. Study the plant weekly for the school year. Observe, record, and discuss seasonal changes.
   C. Keep a record of rainfall. Compare your record to the normal average. Observe the influence of rainfall on plant and animal life.
   D. Take a nature walk at different seasons of the year. Observe seasonal changes in plants and

RESOURCES

MATERIALS AVAILABLE FROM REGION X ON A TWO WEEK LOAN. Order from:

Project E.S.P.
Educational Personnel Development
Consortium D
P. O. Box 1300
Richardson, TX 75080

1. ER97 Solar Energy
2. ER105 Harnessing The Wind

ECOS Training Institute
833 Fox Meadow Road
Yorktown Heights, N.Y. 10598
914/245-6919

Filmstrips:

1. Seasons and Weather
2. Why Does It Rain, Snow, Hail, and Sleet?
3. Why Does the Weather Change?
4. Why Does the Wind Blow?
5. Weather Talk

KEY CONCEPTS Interaction, Adaptation

CONTENT AREA Science

GRADE LEVEL 4

UNIT Weather, Climate, and Life (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: (continued) animals. Draw or take pictures to show these changes. E. Make a solar cooker. Directions available from Environmental Studies Coordinator or ECOS (see resources). SITE: 2. A. Make comparisons between weather conditions at various points on the site. Record and discuss. B. Do campus activity 2D on site.	Books: 1. Hitte, Hurricanes, Tornadoes, and Blizzards, Random 2. Irving, Hurricanes and Twisters, Knof 3. Larrik, Junior Science Book of Rain, Hail, Sleet, and Snow, Garrard 4. Lehr, Paul E., Weather, Golden Press 5. Syrocki, What is Weather, Benefic 6. Tannehill, All About the Weather, Random 7. Tresselt, Hide and Seek Fog, Lothrop 8. Wyler, The First Book of Weather, Watts

KEY CONCEPTS Interaction and Adaptation

GRADE LEVEL 4

CONTENT AREA Science

UNIT Weather, Climate, and Life

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	ENCRICHMENT: 1. Making Raisins - This activity relates well to many subject areas in the elementary curriculum. It is a good example of man's interaction with his environment to produce a product to meet his needs. Complete details are available from the Environmental Studies Coordinator or U. S. Dept. of Agriculture (see resources). SCIENCE STUDY AID No. 1. 2. Cold Weather Protection for Seed - This Science Study Aid deals with the problem of cold weather injury to seeds. The experiments show students how sudden drops in temperature affect plant germination and growth. Details available from Environmental Studies Coordinator and/or U. S. Dept. of Agriculture (see resources). SCIENCE STUDY AID No. 6.	AVAILABLE FROM U.S. DEPT. OF AGRICULTURE Write to: Science Study Aids Information Division Agricultural Research Service USDA Washington, D.C. 20250

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To describe the components of the biosphere to include all living things and their habitats. (1,2)	CLASSROOM: 1. A. Do "Lesson Capsule" activities 1-4 in S.B. TM, pp. 6-7. B. Read and discuss pp. 6-7 in S.B. C. View films from Region X and/or filmstrips. CAMPUS: 1. A. Take a nature walk around the campus. Have students observe and record elements of their biosphere into three catagories - atmosphere, hydrosphere, and lithosphere. B. Locate a large rock on the campus. Turn the rock over and observe the plant and animal life living beneath. A magnifying glass will be helpful. Discuss the concept of habitat and the relationship of these plants and animals to their habitat. SITE: 1. A. Observe a decaying stump or fallen tree. Discuss what type of animal and plant life exist in this type of habitat. B. Animals use plants for shelter in many ways. Birds build nests from grass and twigs in trees. Insects make cocoons in leaves, hide under bark and lay their eggs in twigs to cause galls. The student is to look carefully at various types of plants for evidence of use by animals. Look for: (1) Plants being used by animals (2) Evidence of food or shelter for animals. (3) Animal using plants (4) How the animal is using plants (5) What plants the animal is using.	Science: Understanding Your Environment Silver Burdett, Grade 4 (Referred to as S.B.) Pictures That Teach Silver Burdett American Lung Assoc. Dallas, Texas Environmental Protection Agency, Washington, D.C. Plano League for Environmental Action, P. O. 1177, Plano, Texas 75074 A booklet of dittos entitled Ecology can by ordered from McDonalds. REGION X FILMS: 1. MP7274 - How To Make a Dirty River 27m. 2. MP4635 - Birds, Baboons, and Other Animals: Their Struggle For Survival 19m.

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
		3. MP4723 - Junkdump 15 m.
		4. MP1373 - Man Makes a Desert 10 m.
		5. MP4581 - Buffalo, The Majestic Symbol of the Plains 12 m.
		6. MP4456 - Conserving Our Natural Resources 17 m.
		7. MP7273 - Alone in the Midst of the Land 27 m.
		8. MP5003 - Pollution

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World

OBJECTIVES

2. To use observation to analyze, recognize, and discuss man's influence on the environment. (2, 6)

   To describe and illustrate man's pollution and conservation of resources in his environment. (4,6)

LEARNER ACTIVITIES

CLASSROOM:

2. A. Do "Lesson Capsule" activities 1-8, pp. 9-11; 1-8, pp. 12-13 in S.B.
   B. Read and discuss pp. 9-14, S.B.
   C. Research work p. 15 - activities 1,3,4,5,S.B.
   D. Read the classic Greek myth about Pandora's box, which was given to her for safe keeping (relate to land and natural resources). Change story to say that pollution flew out of the box but that Pandora was able to close it back in the box forever. Students will write stories explaining how she did this.
   E. View film No. 6 - "Conserving Our Natural Resources"
   F. Have a conservation corner. Have exhibits related to conservation. (Examples: wildlife, mineral resources,etc.)
   G. Make a conservation scrapbook.
   H. Trace the origin of things we use. Give the students a list of common items we use everyday and ask them to write down where these items come from. Example: Candy bar - store - candy factory - (ingredients) chocolate - chocolate bean - plantation - cocoa tree - SOIL. Sugar factory - plantation - sugar cane - SOIL. Nuts - peanut distributor - field - peanut plant - SOIL.
   I. Shade in areas of water pollution on an outline map of Plano.
   J.. View films and/or filmstrips from Region X.

RESOURCES

9. MP4020 - How Green Plants Make Food-Photosynthesis 13 m.
10. MP1056 - Let's Watch Plants Grow 11 m.

MATERIALS AVAILABLE ON TWO WEEK LOAN ORDER FROM: Project E.S.P. Consortium D - Region X.

1. ER32 - The Pollution Game
2. ER36 - People Project Cards - Set A and C
3. ER82 - U.S. Dept. of Agriculture, Science Study Aid #5 - Testing For Air Pollution
4. ER88 - The Earth and Nothing More (slide tape program)
5. ER100 - Water Conservation
6. ER250 - Vanishing Wildlife of North America

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: 2. A. Have students observe and discuss the influence of the school building and homes on the environment around the school. What was the area like before man changed it? How was animal life affected? B. Collect pollutants on ten 6x6 pieces of cardboard smeared with vaseline. Place 5 indoors and 5 outdoors. Discuss findings after a few days. Try in other areas of the school. C. Select a site on campus to plant ordinary trash about one foot below the surface. Each six weeks check for decomposition. SITE: 2. A. Conduct a test to prove the necessity of organic material. Take soil samples (not sandy), about twice the size of an egg, from (1) a natural area, and (2) a cultivated field. Fill two wide-mouth jars with water. Leave about an inch of space at the top. Place the lumps of soil inside wire baskets made from screen wire into the jars carefully. Observe and discuss results. (Cultivated soil falls apart, while the other retains its shape. Organic material helps soil hold water, therefore decreases run-off, it improves aeration, and makes soil easier to work.) B. Take a nature walk through the site. Look for evidence of pollution, erosion, conservation, and man's general interaction with the site. C. Tape record the sounds you hear at the site, campus, and school room. (1) How do they make you feel? Why? (2) How do friends feel about them? (3) Write a poem or story about your feelings as you hear these sounds.	RESOURCE PERSONS AND MATERIAL AVAILABLE THROUGH TEXAS A&M RESEARCH AND EXTENSION CENTER, COLLIN COUNTY. Contact: Mr. Risinger 542-4413 (McKinney) Filmstrip: Finding Out About Land, Air, and Water

KEY CONCEPTS Interaction, Pollution,

GRADE LEVEL 4

CONTENT AREA Science

UNIT You and the Living World (p. 3)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	(4) Distinguish between natural and man-made sounds. (5) Discuss noise pollution and its relationship in our environment.	

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World

OBJECTIVES

3. To describe the competition of all living things for the energy available in our environment. (1, 2, 3, 4)

   To compare and contrast the competition of plants and animals. (1, 2, 3, 4)

LEARNER ACTIVITIES

CLASSROOM:

3. A. Do "Lesson Capsule" activities 1-3 in S.B. TM, pp. 16 and 18.
   B. Read and discuss pp. 17 and 18 in S.B. text.
   C. View films from Region X and/or filmstrips.

CAMPUS:

3. A. Identify any examples of plant competition apparent on the campus and return periodically to observe results of competition.
   B. Find examples of unhealthy plants on campus and attempt to fill in the following chart:

HARMFUL FACTORS	HELPFUL FACTORS	WAYS TO IMPROVE CONDITIONS
1. lack of water	1. sufficient sunlight	1. supplemental watering 2. insecticide

SITE:

3. A. Identify plant and/or animal competition observed at site and return to see the progression of the competition. Compare this with any examples found on campus. List and discuss similarities and differences.
   B. Attempt to find fallen seeds and/or seedlings. Make a sketch of the area noting location of each seed or plant. Return to see which plants have flourished. Discuss why some survived while others did not, stressing the competition involved.

RESOURCES

Multi Media from Region X:

1. KT0024 Our Environment II: Sound and Noise
2. KT0026 Our Environment IV: Atmosphere
3. KT0022 Recycling: An Ecology Study

Kits:

1. Creative Moments Kit - Creative Studies, Inc. Boston, MA 02146
2. Water Pollution Kit, Practical Drawing

Books: (teacher)

1. Myers. The Environmental Crisis, Prentice Hall
2. Needham. Pollution: A Handbook for Teachers. Scholastic
3. "An Outline for Teaching Conservation in Elementary Schools", Washington, D.C.: Dep[illegible] of Agricul-

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	C. Dig up a 12 inch square of sod, at least 4" deep at site and plant on campus in a sunny location. Water and keep a weekly record of the following: 1. dominant plants 2. dying plants 3. new plants 4. evidences of competition Discuss what is happening and reasons for it. Compare this sod area to nature surrounding area on campus. Return to site where sod was removed and compare that natural area to the transplanted sod. Discuss similarities and differences between the two and the possible reasons for them.	ture. 4. Air Pollution Primer. National Tuberculosis and Respiratory Disease Assoc. 5. Ecology. American Education Publications (Xerox). 6. The Land We Live On. Doubleday. 7. The Wonderful World. Doubleday. 8. The Web of Nature. Doubleday.

KEY CONCEPTS Interaction, Pollution, Conservation
CONTENT AREA Science
GRADE LEVEL 4
UNIT You and the Living World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To illustrate an understanding of the definitions of a weed. (2,3).	CLASSROOM: 4. A. Do "Lesson Capsule" activities 4-6 in S.B. TM, p. 18. B. Read and discuss pp. 17 and 18 in the text. C. Do extension activity in TM p. 18 D. View films and/or filmstrips. CAMPUS: 4. A. Have students point out "weeds" on the campus and justify their classification as a weed. B. Try to identify weeds found in reference books or, if possible, send weed samples taken from school grounds to nearest agricultural college for identification.	

KEY CONCEPTS Interaction, Pollution, Conservation
CONTENT AREA Science
GRADE LEVEL 4
UNIT You and the Living World.

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. To identify plants harmful to other living organisms. (2,3) To describe methods by which harmful plant competitors can be controlled. (2,6).	CLASSROOM: 5. A. Read and discuss pp. 20-22 in text. B. Have students research and report on selected parasites. C. Do investigation 2 on p. 23 in text. D. Plant weeds in box to represent orchard. Spray the weeds with paint to represent pesticide. Water the weeds like a rainstorm and discuss what happens to the paint, emphasizing the necessity of care in the control of harmful plants. E. Grow bread or fruit mold. Record observations. F. View films and/or filmstrips from Region X. CAMPUS: 5. A. Locate any parasitic growth on campus plants. B. Sketch located parasitic growth and use reference books to attempt identification. C. Periodically return to observe the growth of the parasite and its effect upon its host. D. Grow and cultivate mini-gardens.* SITE: 5. A. Find examples of parasitic growth at site and compare to those found on the campus. B. Return at a later date to observe progress of parasitic growth. C. After studying lichen, a combination of algae and fungi, search for samples at the site. Observe through a magnifying glass and record observations such as smell, color, feel, etc.	* USDA Home and Garden Bulletin 163, "Mini-gardens for vegetables" or Science Study Aid No. 2; Teacher's Guide to Minigardens.

KEY CONCEPTS Interaction, Pollution, Conservation

CONTENT AREA Science

GRADE LEVEL 4

UNIT You and the Living World

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

ENRICHMENT:

1. The Flick Click: pamphlet describing method of measuring noise. Available from Environmental Studies Coordinator and/or:

   Ecos Training Institute
   833 Fox Meadow Road
   Yorktown Heights, N. Y. 10598

2. Objective: The student will be able to make and investigate a landfill.
   a. Materials:
      (1) Clear plastic glasses or containers.
      (2) Soil (preferably loam)
      (3) Bits of garbage cut in pieces less than 1" square (use bread crusts, banana peel, orange peel, etc...)
      (4) Aluminum Foil.
   b. Procedure:
      (1) Place soil in the plastic containers leaving about one and a half inches of airspace at the tops. (You may want to use several containers, each holding a different kind of garbage.) Bury the garbage in the soil at different depths against the outside of the container so you can observe changes.
      (2) Mark the soil level with a magic marker or tape.
      (3) Make sure your soil is moist but not waterlogged.
      (4) Cover the container tightly with aluminum foil.
      (5) Keep records of the changes that take place in the landfill as mold begins to grow and the garbage it grows on begins to decompose. Observe the

KEY CONCEPTS Interaction, Pollution, Conservation
CONTENT AREA Science
GRADE LEVEL 4
UNIT You and the Living World (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

ENRICHMENT: (Continued)

rate of decomposition or the type of mold with different types of garbage and any other organisms other than mold growing.

(6) As decomposition continues notice also the changes in soil level and the empty spaces. (Are they really empty?).

c. Results:
The garbage decomposed and resulted in usable material (compost).

d. Conclusion:
The student can see a form of recycling our organic wastes.

3. Going Further: Investigate the following questions:
   - a. What could happen to buildings built on landfills?
   - b. Would landfills be a good place for new housing?
   - c. Would sanitary landfill or compost areas be a solution for disposal of inorganic wastes?
   - *d. To use the landfill method of solid waste disposal a community needs one acre for every ten thousand people each year. How many acres would Plano need each year?
   - *e. Can a garbage pile increase the value of your property? Find out why land values increased near a proposed land landfill site.

* More Difficult.

KEY CONCEPTS Conservation/Soil Mangement

CONTENT AREA Science

GRADE LEVEL 5

UNIT Soil

OBJECTIVES

1. Identify different types of soil. (5)
2. Make a chart comparing absorbancy rate of soil. (5)
3. Identify some of the soil components. (5)
4. Suggest ways to improve environment. (6)

LEARNER ACTIVITIES

CLASSROOM:

1. Investigation "Activity" 14 page 85, 5B.

2. Using 6 tin cans of the same size, remove tops and bottoms of all but 1. Mark 1/2" from the rims. Press cans into soil to mark in each of soils: clay or loam, sandy, rich garden, lawn where grass grows well, trampled soil on lawn. The 6th can is used as a watering can for other 5.

   Record on a bar graph the amount of time it takes for absorption as soon as water is poured and measure the time it takes until no more water remains in the can. Record location, appearance of soil, and amount of time required for absorption.

3. Stake out an area 1 meter square on the forest floor and sift through the top 7-8 cm of soil, recording what plant and animal life is observed.

NAME OR DESCRIPTION OF ITEM IN SOIL	QUANTITY	POSSIBLE EFFECT ON SOIL

4. Make up an artificial 1/2 acre residential land that has no landscaping. Have a small creek running through the property. Provide the students with graph paper, and tree and shrub catalogs. Have them plan the cost of landscaping the 1/2 acre plot. Have them transfer the plan onto the grid in scale-model. Have students compare their plans, taking in use of the area, beauty of the area. Discuss actual parks and their aesthetic appeal.

RESOURCES

Understanding Your Environment, pg. 84-88.

Soil Conservation
U.S. Dept. of Agr.

Texas A & M
Films:
The Earth, It's Structure
MP1277 Region X
The Soil and Life
MP4044 Region X

Transparencies:
Weathering, Erosion
OTD-ES-41-011-3
Weathering and Soil Development OTD-ES-41-034-3

Pg. 88, Understanding Your Environment

Soil Conservationist

Landscape Artist

KEY CONCEPTS Conservation/Soil Management

CONTENT AREA Science

GRADE LEVEL 5

UNIT Soil

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

CAMPUS:

1. A. Have groups of students collect soil samples from varied areas of school campus: creekbed, near trees, flower beds, playground.
If it feels gritty . . . sand.
If it feels smooth and slick,
not very sticky . . . silt
If it feels smooth, plastic,
very sticky . . . clay

2. B. Invite a city engineer to explain how building sites are located according to soil types.

3. C. Make a list of the things children think they will find on the forest floor when they visit the site.

4. Find a heavily eroded area on or near your campus. Plant some shrubs, wildflowers, etc. to prevent erosion.

SITE:

3. At the site, divide students into small groups. On notebook paper, have them predict what they will find in the top few inches of the forest floor. Measure out an area 1 meter square. Sift through top 8 or 9 cm. Teach litter,(identifiable dead things on surface) duff,(partially decomposed organic matter compacted), humus,(almost completely decomposed non-identifiable organic matter). Groups classify things in one of these 3 categories.

TERM	DESCRIBE THE FEEL	LIST IDENTIFIABLE PART OF PLANTS, ANIMALS
Litter		
Duff		
Humus		

KEY CONCEPTS Conservation/Soil Management

CONTENT AREA Science

GRADE LEVEL 5

UNIT Soil

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 3. Move the class to an area where you could view a soil profile. Point out to the students the different layers. Most soils have 3 major layers; topsoil, subsoil, and parent material, because soil formation has many variables, you may find more or less. Measure and record the depth of each major layer. Identify the color and texture of each layer. A good activity would be to allow the kids to draw the soil profile, color and label it. 4. On the site, locate area where topsoil has been eroded away. Discuss what kind of things could have been put there that would have delayed erosion. Compare the types of plants that flourish in the subsoil and topsoil.	

ENRICHMENT ACTIVITIES

Have these students determine and record the temperature of different layers of soil. Also, using a PH kit, record the PH of each layer. (This could be done with Site Activity #1)

PH (acidity or alkalinity) kits available through Central Administration Environmental Department.

KEY CONCEPTS Energy, Stewardship, Conservation

GRADE LEVEL 5

CONTENT AREA Science

UNIT Energy

OBJECTIVES

1. Recognize the difference between kinetic and potential energy. (1)
2. Recognize that all living things depend on the sun's energy. (1)
3. Understand that through photosynthesis energy from the sun is converted into a form that all living things can use. (1)
4. Observe amounts of energy from the sun utilizing the body senses. (1)

LEARNER ACTIVITIES

CLASSROOM:

1-4 Read and discuss pg. 193-200 in Understanding Your Environment.

5. Put the following information on the board:

TEMPERATURE

55	60	65	70	75	80	85	90	95
1/2	3/4	1	2	3	5 1/4	4	2 1/2	1

Growth of seedlings in centimeters.

Explain to students that someone did an experiment with pea seedlings to find out how much they would grow each day at a certain temperature.

Have students graph this information on centimeter graph paper.

Answer these questions (discussion or written)

- a. What temperature did the plants grow the most? Least?
- b. Which temperature was the most like a cool day? A hot day?
- c. What was the best temperature for the plants?

6. Make a collage of the sun using magazines, newspapers, etc. Discuss the various uses of the sun.
    - a. Do research on ancient civilizations (Aztecs, Egyptians) and discuss how they worshipped the sun.

RESOURCES

Films

Food: Energy from the Sun

Energy and its Forms

Energy: New Sources

Region V

Audio Tape

Fire In the Sun

Contact a local photographer to talk about sun's impact on camera shots.

KEY CONCEPTS Energy, Stewardship, Conservation

CONTENT AREA Science

GRADE LEVEL 5

UNIT Energy

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. Interpret a chart showing the growth of plants in centimeters for any day or height included in the chart.	CAMPUS: 2-4 Walk around school yard three different times on a sunny day: early morning, noon, and late afternoon. Observe: 1. Shadows 2. Plant growth as affected by sunlight. 3. Position of sun in sky and the path of sun. Relate this to design of school building.	
6. Show awareness of surface characteristics of the sun by making a collage which illustrates these characteristics.	SITE: 1-4 Take a radiometer outside, (available at Jr. High Schools, Science stores) place it in sunny and shady areas, observe the harnessing of the sun's energy. 5. Observe the growth of plants in sunny and shaded places, compare findings. In shady regions, look especially for plants that are growing abnormally to get to the sunlight.	

ENRICHMENT ACTIVITIES

Have students list the ways people try to control the sun's heat rays and use it to modify temperature.

(Examples) Modern Man

1. Color of clothing
2. Building design
3. Heating systems
4. Sunglasses

Primitive Man

1. Clothing
2. Use of fire
3. Shelters used

KEY CONCEPTS Adaptation

GRADE LEVEL 5

CONTENT AREA Science

UNIT Plants

OBJECTIVES

1. Identify major parts and functions of a plant. (2,3)
2. Use a microscope to observe plant parts. (2)
3. Collect data and construct a graph on amounts of plant growth. (2,3)
4. Observe and identify similarities in plants. (5)
5. Distinguish between kinds of reproduction in plants. (3)

LEARNER ACTIVITIES

CLASSROOM:

1-3. Study new plants or seeds children have brought in, either planted in soil or rooting in water. Keep a line graph of growth of roots and/or plant over a 3-week period.

4. Observe and sketch plants as seen under a microscope.

5. A. Pg. 127 Understanding Your Environment Investigation 21
   B. Pg. 129 Understanding Your Environment Investigation 22

7. Divide the class into small group, each having at least 5 small planting containers. Each container should have soil from the same source, and labeled A, B, C, D, and E. Plant widely differing numbers of seeds of the same kind (radish, tomato, corn, etc.) Example:
A = 2 seeds, B = 4 seeds, C = 8 seeds, D = 16 seeds, E = 32 seeds.

Observe and keep records of growth results during a period of 2-4 weeks, maintaining the same light, temperature, and moisture for all containers.

Discussion Questions:

What conclusions can be drawn about crowding and growth in plants? What does this mean to a gardner or farmer? Obviously crowding affects plant growth. Does it affect animal growth?

RESOURCES

Background facts:
Silver Burdett
Understanding Your Environment, pg. 105-112

Plano Garden Society

Fair Park Museum of Natural History will send out person to build terrarium with class.

Films:

MP4653	The Desert Community
MP1155	How Flowers Make Seeds
MP4020	How Green Plants Make Food
MP4930	Mountains
MP1156	Movements of Plants
MP1158	Plants that Live in Water
MP4572	Secrets of the Plant World
MP1062	Why Plants Grow Where They Do

KEY CONCEPTS Adaptation/Eco. Community Relationships

CONTENT AREA Science

GRADE LEVEL 5

UNIT Plants

<table>
<tr><th>OBJECTIVES</th><th>LEARNER ACTIVITIES</th><th>RESOURCES</th></tr>
<tr>
<td>6. Recognize physical protection of plants. (5)

7. Show the effects of overcrowding. (3)</td>
<td>CAMPUS:
1. Identify parts of plants and trees on the playground.

3. Build a terrarium using plants from school grounds and those brought in for graphing.

4. A. Construct a garden area and plant seeds and seedlings on campus.
B. Use the atrium or school grounds to see patterns and similarities.

5. Do #3 "Activity" pg. 143 Understanding Your Environment.

6. Find areas around the campus where plants are competing for sunlight. Make a table!
<table>
<tr><th>AREA DESCRIPTION</th><th>DOMINANT PLANT</th><th>EVIDENCE OR COMPETITION</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>
Sit in these areas and close your eyes, feel the sunlight. Try to imagine you are a plant. Move to a shaded area and do the same. Discuss the differences in the 2 areas.</td>
<td>Background facts:
Pg. 115-142
Understanding Your Environment</td>
</tr>
</table>

KEY CONCEPTS Eco-Community Relationships

CONTENT AREA Science

GRADE LEVEL 5

UNIT Plants

OBJECTIVES

LEARNER ACTIVITIES

RESOURCES

SITE:

4. Observe areas where leafy and grassy plants thrive. Discuss various reasons for patterns. What grows around water? What thrives in dry areas?

6 A. Measure off an area for children to observe plants that have evidence of protection from animals. Make a table:

PLANT	WEAPON USED FOR PROTECTION

6. B. Keep sketches of plants and their types of protection. Questions for discussion:
   1. Sometimes cactus and other plants with thorns are taken away by ranchers. Will this allow only grass to grow?
   2. What would probably happen if berry vines didn't have thorns?
   3. Why do you think grass burrs have stickers?

4-7 Measure a 10 foot by 10 foot area and record kinds of plants found and numbers of specimens sited:

TREES	NUMBER
Vines	
Shrubs	
Lichen	
Algae	
Fungi	
Mosses	
Grasses	
Other	

KEY CONCEPTS Adaptation, Interaction

CONTENT AREA Science

GRADE LEVEL 5

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Recognize the parts of an animal and identify their functions. (2) 2. Discuss how each class of animal adapts to his environment. (2,3) 3. Classify animals into vertebrates and in-vertebrates. (2) 4. Demonstrate and observe that living things are interdependent with one another and their environment. (2, 5, 6)	CLASSROOM: 1-4. Read and discuss background information from Understanding Your Environment. 2. Investigation 49 pg. 276 Understanding Your Environment. 3. A. Look at prepared slides or slides made by children on single cells and simple multi-called animals. 4. Students select one from the following list: coyote mouse rabbit snake - grass owl snail deer raccoon vulture algae oak tree cattails hawk grasshopper sparrow fish toadstool fox spider dog cow tapeworm corn flea beaver cat wildcat skunk frog woodpecker. Arrange desks in a circle, leaving room for the teacher to walk around on the outside. Each child holds a card with the organism's name on it. A skein of yarn rolled into a ball will be needed. Ask a child representing a consumer to choose an organism he would eat for food. Connect the yarn between the "eaten" and the "eater." Continue the process until each organism is holding part of the string. Be sure students realize they represent a population and can be eaten by several others. Once the teacher has connected sufficient strings, have all students tape string to their desks. Students may then sketch the food web they formed before leaving the circles. When food web is finished, hang signs and strings from ceiling so students can view it over a period of time. For additional lessons, cut the string at one or 2 points to demonstrate the effect of the web when "strands" are destroyed.	Pg. 259-279 Understanding Your Environment "Deserts and Man" "Ecology" Environmental Reader Golden Nature Guide: Pond Life Films: MP4838 Animals Need You MP1152 Animals Without Backbones MP7179 Arctic Region and It's Polar Bears MP7141 Beaver Valley MP4635 Birds, Baboons and Other Animals: Their Struggle for Survival MP1415 The Cow MP4653 The Desert Community MP5020 Green Sea Turtle MP4930 The Mountains MP5017 Return of the Sea Elephant MP4486 The Terrarium, Classroom Science MP1177 Birds of the Marshes

KEY CONCEPTS Adaptation, Interaction

CONTENT AREA Science

GRADE LEVEL 5

UNIT Animals

OBJECTIVES

LEARNER ACTIVITIES

CAMPUS:

3. A. Do "Investigation 45" pg. 262 Understanding Your Environment.
   B. Do "Investigation 47" pg. 267 Understand Your Environment.

1. Exercise #3 pg. 269 Understanding Your Environment.

4. Exercises #2 and 5 pg. 279 Understanding Your Environment.

SITE:

1. Use collecting equipment (like screens, nets, small jars, etc.) to gather as many types of aquatic animals as possible. Put them in white containers to be observed.

3. Using pictures of various animals, have children generally classify the specimens found.

DESCRIPTION OF WHERE FOUND	TYPE (name or sketch)	NO.

Be sure to return animals as soon as finished.
Answer questions on paper or as discussion:
1. What animals did you find?
2. Where did you find most of the specimens?
3. What similarities did you find?
4. What were the differences?
5. How could we classify these animals?
6. What other life do you think you could find in the stream/pond?

4. Find a rotten stump or log. Begin discussion of the following questions:

RESOURCES

MP1153	Camouflage in Nature Through Form and Color Matching
MP1154	Camouflage in Nature Through Pattern Matching
MP4582	Nature's Strangest Creatures

KEY CONCEPTS Adaptation, Interaction

GRADE LEVEL 5

CONTENT AREA Science

UNIT Animals

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 1. What things about this stump give us clues about past events that have taken place? 2. What factors caused these things to happen? Discuss why the stump should not be torn apart. Record the following information:	

LIVING THINGS	EFFECT ON STUMP OR LOG

NON-LIVING THINGS	EFFECT ON STUMP

KEY CONCEPTS Energy

GRADE LEVEL 6

CONTENT AREA Science

UNIT Water in the Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Define relative humidity, evaporation, and condensation. (5)	CLASSROOM: 1. Students write definitions of evaporation, condensation, relative humidity.	STEM, pp. 32-35, 40-45. STEM, p. 43.
2. Determine the relative humidity in the classroom using a wet bulb thermometer and a dry bulb thermometer. (5)	2. LAB A: What is the relative humidity in the classroom? See attached sheet.	REGION X FILMS: What Makes Clouds?, MP 46 Formation of Raindrops, MP 7001. Plant-Animal Communities: Physical Enviroment, MP 1
3. List water vapor sources in the classroom. (5)	3. Students list some water vapor sources in the classroom. Ask them if they are a source.	
4. List apparent sources of water vapor around the campus. (5)	CAMPUS: 4 - 7. LAB B: What is the relative humidity on the school ground on the north, east, south and west sides of the building, on top of and underneath shrubbery, and what are some causes of the differences found? See attached sheet.	STEM, pp. 40-41.
5. Determine the relative humidity on the north, east, south and west sides of the building, also on top and underneath some shrubbery. (5)	SITE: 8 - 11. LAB C: What is the relative humidity in the grassy area, at the edge of the woods at eye level, at the edge of the woods at ground level, and in the woods 150 feet at eye and ground level and along the stream? Also what are some reasons for differences found? See attached sheet.	
6. Compare the relative humidity at the various locations. (5)		

KEY CONCEPTS Energy

CONTENT AREA Science

GRADE LEVEL 6

UNIT Water in the Air

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
7. Hypothesize why the relative humidity was highest and lowest at the locations tested. (5)		

Classroom Activity (2)

LAB A: What is the Relative Humidity in the Classroom?

MATERIALS: 2 Celsius thermometers
2 short pieces of shoelace
thread

PROCEDURE: STEM pp. 42-43.

OBSERVATIONS:

1. What was the temperature before one of the thermometers was wetted? ____________
2. What was the temperature of the dry bulb thermometer after fanning? ____________
3. What was the temperature of the wet bulb thermometer after fanning? ____________
4. What was the difference between the dry bulb and wet bulb temperatures ($T_D - T_W$)? ____________
5. Does the wet bulb thermometer gain or lose energy? __________
6. Can the wet bulb temperature be higher than the dry bulb temperature? Explain your answer using the words evaporation and energy.

CONCLUSION:
What is the relative humidity in the classroom? ______________%

Campus Activity (4-7)

LAB B: What is the relative humidity on the school ground on the north, east, south and west sides of the building, on top and underneath shrubbery, and what are some causes of the differences found?

MATERIALS: 2 Celsius thermometers
2 short pieces of shoelace
thread

PROCEDURE: STEM p. 43.

OBSERVATIONS:

1. What are the dry and wet bulb temperatures at the following locations?

	T_D*	T_W**	T_D-T_W
North side of building	____ °C	____ °C	____ °C
East side of building	____	____	____
South side of building	____	____	____
West side of building	____	____	____
On top shrubbery	____	____	____
Underneath shrubbery	____	____	____

* T_D = Dry bulb temperature
** T_W = Wet bulb temperature

2. Where was the T_D highest and lowest?

3. Where was T_W highest and lowest?

CONCLUSIONS:

1. What was the relative humidity at the following locations?

	Relative Humidity (from table STEM p. 43
North side of building	____
East side of building	____
South side of building	____
West side of building	____
On top of shrubbery	____
Underneath shrubbery	____
TOTAL	____ 6 = Average ____

Conclusions continued:

2. Was the average humidity outside higher or lower than that inside the building?

3. Explain why you think the relative humidity was highest or lowest inside or outside.

4. List some apparent water vapor sources outside the building.

5. On which side of the building was the relative humidity highest? _____________ Lowest? _______________

6. Explain why you think the relative humidity is highest and lowest in the locations determined.

7. Was the humidity higher on top or underneath the shrubbery?

8. Why do you think this was the case?

9. Does shade affect the relative humidity?

10. Does vegetation affect the relative himidity?

11. Does wind affect the relative humidity?

Campus Activity (8-11)

LAB C: What is the relative humidity in the grassy area, at the edge of the woods at eye level and at ground level, and in the woods 150 feet at eye and ground level and along the stream? Also what are some reasons for differences found?

MATERIALS: 2 Celsius thermometers
2 short pieces of shoelace
thread

PROCEDURE: STEM p. 43

OBSERVATIONS:

1.	T_D	T_W	T_D-T_W
Grassy area	_____	_____	_____
Edge at eye level	_____	_____	_____
Edge at ground level	_____	_____	_____
In woods at eye level	_____	_____	_____
At stream	_____	_____	_____

2. Where is temperature the lowest?

3. Where is temperature highest?

4. Does temperature affect evaporation?

5. Will warm or cold air hold more water?

6. Does temperature have an affect on relative humidity? Explain your answer.

7. Does vegetation affect temperature? Explain.

8. Does temperature affect vegetation? Explain.

9. Does vegetation affect relative humidity?

10. Does relative humidity affect vegetation?

11. What are some sources of water vapor at each location tested?

grassy area -

edge of woods -

in woods -

at stream -

CONCLUSION:

1. What is the relative humidity at the following points?

Relative Humidity

grassy area ________%

at edge of woods at eye level ________

at edge of woods at ground level ________

in woods at eye level ________

in woods at ground level ________

at stream ________

2. Where was the relative humidity highest? Explain why you think this was the case.

3. Where was relative humidity the lowest? Explain why you think this was the case.

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 6

UNIT Senses

OBJECTIVES

1. Participate in activities utilizing the various senses. (2,6)
2. List sounds perceived outside the building. (2)
3. Observe a square foot of ground listing the living things found there. (2)
4. Feel and describe a plant, a rock and an animal. (2)
5. Smell and describe a plant, a rock, and an animal. (2)
6. Taste something found outside the building that is not manufactured. (2)
7. Make observations of the environment individually utilizing each of the 5 senses. (2, 6)

LEARNER ACTIVITIES

CLASSROOM:

I. A. What Common Sounds Can Be Indentified?

Materials: Tape recorder
Prerecorded tape of common sounds (i.e., a jet plane, auto tires screeching, a bouncing ball, a ping pong game, a closing door, a clock ticking, a dropped coin, crumpling a piece of paper, breaking a stick, water running, etc.)

Procedure: Teacher plays tape of a variety of common sounds such as those listed. As the tape is played with pauses between sounds, students try to identify and list the sounds.

B. Sight and Smell

Materials: Baby food jars
Food coloring
White vinegar
Substances that look the same and smell different
Substances that look different and smell the same.

Procedure: To help children distinguish certain objects by odor characteristics rather than visual characteristics, fill one baby food jar with water and one with white vinegar. Allow children to describe the visual characteristics of the two jars. Then let students use their sense of smell to classify the odors. The jars look the same but smell different. The teacher may likewise fill jars with substances that look the same and smell the same. Or fill jars with substances that look

RESOURCES

Today's Basic Science, pp. 263-283.

Basic Health Science, pp. 93-115.

KEY CONCEPTS Interaction

GRADE LEVEL 6

CONTENT AREA Science

UNIT Senses

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

different but smell the same (use food coloring). Or fill jars with substances that look different and smell the same.

C. Can Students Identify Objects By Touch

Materials: Various materials to be identified by May include handkerchief, pencil, ballpoint pen, silk scarf, chalk eraser, wool scarf, sandstone rock, etc.

Procedure: Someone blindfolds student. Objects are handed to student or lined up in front of him. Student touches objects and tries to identify them.

Observation: Can student identify the objects?
Could student distinguish the wool from the silk?
Could student identify rock as sandstone?

Conclusions: Which objects could the student identify?
Which objects could the student not identify?

D. Sense Classification

Materials: Teacher prepares list of objects i.e. lemon, brook, apple juice, water fall, tree, etc. or phenomena i.e., clap of thunder, cool breeze, rain, tornado, etc.

Procedure: Students prepare a sheet with 5 columns of 6 spaces each. (See next page for example)
Across the first row of spaces, the students list the five senses.

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 6

UNIT Senses

OBJECTIVES

LEARNER ACTIVITIES

RESOURCES

As the teacher calls out the names of objects or phenomenon the students list them in the boxes below the appropriate heading of the sense that is usually used to identify the subject in its normal setting. The first student to complete a column or the entire sheet as time and teacher descretion permit, can call out "Bingo!"

He can then have his sheet checked for accuracy and possibly be declared the winner.

Smell	Taste	Feel	See	Hear

E. **Materials**: Onion, potatoe, apple, carrot

Procedure: Students from each class are selected to bring each of the objects. The materials are sliced into small portions. One at a time students are blindfolded and while holding their noses, are asked to taste various portions given them.

KEY CONCEPTS Interaction

GRADE LEVEL 6

CONTENT AREA Science

UNIT Senses

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	Usually three to a person are enough. Students are asked to identify the substance quickly for the class. If too much time is given the student can identify the fruit or vegetable by its texture. Usually the student tested will miss one or more of the identifications which demonstrates the interrelations of the senses. CAMPUS: 2. Lab A: What sounds are found outside around our building? See attached sheet. 4. Lab B: How many different living things can be found in one square foot of school ground? See attached sheet. 5. Lab C: How can the feel of a plant, an animal, and a rock be described? See attached sheet. 6. Have students shut eyes and each give a one word description for the class. 7. Each student should taste and describe something found outside the building that is not commercially prepared or manufactured. SITE: 8. Senses scavenger hunt. Students take attached sheet and identify as many items as possible using the five senses.	

LAB A: SOUND - Which are natural and which are man made?

MATERIALS: none

PROCEDURE: Students outside the building and sitting down are asked to:
1. Be absolutely quiet for one minute.
2. Listen for all sounds.

OBSERVATIONS: List sounds that are heard and can be identified.

CONCLUSION:
1. Which sounds were natural?

2. Which were man made?

LAB B: VISION - How many different living things can be found in one square foot of school ground?

MATERIALS: a ruler or a one foot template

PROCEDURE:
1. Mark off a one foot square of campus.
2. Determine the number of different living things that can be directly observed in the marked plot.

OBSERVATIONS:
1. How many animals can be found?
2. How many plants can be found?

CONCLUSIONS:
1. What is the total number of types of living things found in the plot?

2. Do you think this would vary from place to place around campus?

Campus Activity

LAB C: How can the feel of a plant, an animal and a rock be described?

MATERIALS: an animal (another student is a possibility)
a plant
a rock

PROCEDURE:

a. Find the three objects.
b. Shut eyes and feel the objects one at a time.

OBSERVATIONS:

a. Describe your objects to another student in such a manner that he could pick your rock, plant or animal out of a group of these.
b. Can the person you described your objects to pick out your object from a group of similar objects?

CONCLUSIONS: Write descriptions of each of your three objects.

SENSES SCAVENGER HUNT

THINGS TO SEE

___A rounded stone (put it back)
___A wood tick
___A red and black bird
___A milkweed pod
___An orange butterfly
___A bird's nest (don't touch)
___A cocoon (leave it there)
___A cloud moving
___A cattail
___A feather
___A hole in a tree
___A yellow leaf
___An ant
___A seed

THINGS TO HEAR

___A mosquito buzzing
___Wind blowing through the field
___Something jumping into the water
___The hammering sound of a wood pecker
___Dry leaves under your feet
___A bee
___Trees in the wind
___A bird call
___A stick breaking

THINGS TO SMELL

___Inside a hollow log
___Crushed green grass
___Crushed dry leaves
___2 kinds of flowers (don't pick them)
___Water in a marsh

THINGS TO FEEL

___Rotten wood
___A mushroom
___A fuzzy plant
___A thistle
___Wet mud
___Dry soil
___A mosquito bite
___Shade
___A turtle shell
___A feather tickling
___The wind on a hill
___Tree bark

THINGS TO TASTE

___A green leaf
___Something sweet
___Something sour
___A bitter seed
___Your own forearm
___A piece of clover

KEY CONCEPTS Energy

CONTENT AREA Science

GRADE LEVEL 6

UNIT Solar Energy

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. List several energy sources to include fossil fuel, solar and nuclear. (1) 2. Describe fossil solar and nuclear energy sources. (1) 3. Describe how all life is dependent upon solar energy. (1) 4. Utilize solar energy to perform a service. (1) 5. Compare the growth of plant receiving the most light with those receiving the least light on campus. (1) 6. Compare the number of specimens of a kind of plant found in a shaded area with the number of specimens of that kind of plant found in a sunny area. (1)	CLASSROOM: 1 and 2. Discussions about various energy sources, their advantages and their disadvantages. 3. Class dissussions about dependency upon solar energy for photosynthesis as the foundation of life. CAMPUS: 4. This service could be: Start a cooking fire, using a lens draw on a board, cook something with only solar energy in a homemade oven, grow a plant, etc. 5. Lab A - Does the amount of light a plant receives affect its growth? See attached sheet SITE: 6. Does light affect plant number? (See attached sheet)	Eaton, William W., "Solar Energy", Energy Research and Development Administr tion, Office of Public Affairs, Washington, D.C. 1976. The Energy Challenge, Federal Energy Administra tion, Washington, D.C. Energy Conservation Resou for Education, Department of Industrial Education, Texas A&M University, College Station, Texas, 1976. Energy Primer, Portola Institute, Menlow Park, California, 1974. Halacy, Dan, Jr., "Solar Science Projects", Schola tic Book Service, Englew Cliffs, NJ, 1974. Thomas, Dian, "Roughing i Easy", Brigham Young Univ Press, 1974.

Campus Activity (5)

LAB A: DOES THE AMOUNT OF LIGHT A PLANT RECEIVES AFFECT ITS GROWTH?

MATERIALS: none

PROCEDURE:

1. Determine the side of the building that receives the most sunlight.
2. Determine the side of the building that receives the least sunlight.
3. Find a plant common to both the side of the building receiving the most and the least amount of sunlight.

OBSERVATIONS:

1. Which side of the building receives the most sunlight?
2. Which side of the building receives the least sunlight?
3. Is there a type of shubbery found on both sides of the building?
4. Is there a type of grass found on both sides of the building?
5. On which side of the building are the plants the largest?
6. On which side of the building are the plants in question the smallest?

CONCLUSIONS:

Does the amount of light a plant receives affect its growth?

Site Activity (6)

LAB B: DOES LIGHT AFFECT PLANT NUMBER?

MATERIALS: pins, cardboard, twine, yardsticks, stakes

PROCEDURE:

1. Take the class to a part of the site which is not shaded.

2. Provide teams of students with yardstick, four stakes, and about four feet of twine. With this material, they will rope off one-foot square plots. (Or use a wire hoop tossed on the ground to delinate an area.)

3. Have each team use the stakes and string to rope off a plot one foot on each side, in an area that is sunny most of the day.

4. Each team may now examine its plot for different kinds of plants. Have each team pick one plant each, of the three most abundant kinds of plants in their plots, and pin them to a centrally located piece of cardboard.

5. From this collection, select a kind of plant which is found in all or most of the plots. Have each team count the number of specimens of that plant in its plot.

6. Have the teams select other plots in an area which is shaded most of the day but which also has vegetation. Have students carefully count and record the number of specimens of the selected plant in their own plots which are found in this shaded area.

7. Return to the classroom and have each group of two or more teams combine data. Can they see any significant differences between the sunny and shaded area? Take an average for the class of the number of selected plants per plot in the shade and compare it with the average number per plot in sunlight. (They could compare the total number if they cannot do averages) Is there a significant difference? Does shade seem to have a good or a bad affect on this plant's growth?

NOTE: Don't change the type of area when changing from sunny plot to a shaded plot. Otherwise you may introduce variables other than amount of sunlight. For example, the type of soil may be different. If you are studying sunny plots on the sloping part of the site, try to stay on the sloping part to study the shady plots.

Ask the students about shade and its effects upon other things in the enviroment. Ask if shade is necessary. How does shade from some plants affect other plants? How might that affect animals? What happens to plants and animals when there is complete shade (nighttime)?

KEY CONCEPTS Interaction

CONTENT AREA Science

GRADE LEVEL 6

UNIT Using Forces

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. Define force and give classroom examples of it. (5)	CLASSROOM: 1. Students write definitions of force and give oral examples from the classroom. Example: legs of chair applying force to hold seat of chair up; walls exerting force to hold ceiling; etc.	STEM, pp. 102-131. REGION X FILMS: Balancing Forces, MP 4389. What is Force?, MP 1147. The Force of Gravity, MP 7072.
2. Construct a device to change the strength and or direction of a force. (5)	2. Students given advanced notice of assignment and are responsible for supplying their own materials. Devices may be as simple as using a pencil as a lever to as complex as a sophisticated system of pullies and levers.	
3. Identify interacting forces around campus. (5)	CAMPUS: 3. Have students identify some interaction forces around the campus. (i.e., a see saw, walls supporting roof opposing force of gravity, tree trunk supporting branches and leaves against the force of gravity.) Students engaging in a game of tug-of-war would be a very good way to bring out the concept of opposing forces.	
4. Identify examples of forces and opposing forces around site. (5)	SITE: 4. Examples: Tree trunks holding branches against force of gravity, birds wings holding bird in air against force of gravity, plant roots forcing between soil particles and soil forcing back, etc.	
5. Find evidence of previous forces that no longer exist. (5)	5. Evidence of forces that no longer exist could be: fallen tree, blown off branch, a stepped-on weed, a cracked acorn, a broken blade of grass, etc.	

KEY CONCEPTS Interdependence, Balance of Nature, Pollution

GRADE LEVEL 7

CONTENT AREA Life Science

UNIT Classification and the Three Kingdoms: Classification System

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To recognize evidences and characteristics of living things (5,6)	CLASSROOM: I. A. Use discussion and filmstrips to determine the characteristics of living and non-living things. B. Let the class list evidences of the fact that people have been in their classroom. CAMPUS: I. Have the students compile a list of living and non-living materials found on the campus. (Note: This can be done from memory, or include a short walk around the campus). SITE: I. A. Look for evidences that living things inhabit the site. (Examples: bore holes, eggs, eaten leaves, rotting or decaying wood, chewed bark, knife marks, garbage). B. Look for evidences of polluters.	Focus on Life Science; Merrill; pp.26-32 Life Its Forms and Changes - Harcourt-Brace and World; pp. 76-81 Man and the Environment; Houghton-Mifflin; pp.78-85 Field Study Manual for Outdoor Learning; Burgess; p. 67 & 90

KEY CONCEPTS Adaptation, Balance of Nature

GRADE LEVEL 7

CONTENT AREA Life Science

UNIT Classification and the Three Kingdoms: Invertebrates

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To identify the basic groups of invertebrates and their characteristics (2,3) 2. To identify common invertebrates that live in the soil. (2)	CLASSROOM: 1. A. Reading: LIFE, pages 322-326 (flat and roundworms) and pages 341-368 (segmented worms, mollusks, arthropods). B. Use films, filmstrips, etc. to familiarize students with characteristics of soil invertebrates. C. Lab: Show specimen of invertebrates (plastic mount or in preservative in jars). Use library books to identify lab specimen. D. Discuss the use of common names according to local sources and how many insects are called different common names in different parts of the country. Point out the importance of technical names for world wide communication. CAMPUS: 2. A. Look for and identify as many invertebrates as possible on the ground, on plants, in the air. Suggest that each lab group list what they find as common names; give technical names and draw if they wish. Talk about different habitats for different invertebrates. B. Take soil cores at different locations on the campus. Compare habitats, populations (numbers of each species), and variety (number of different species) at each site. Getting the animals from the soil core is described in ECOLOGY, pages 137-138. Insect Collecting p. 166-174, Terrestrial Ecology. SITE: 2. Repeat campus activities 2A and 2B at the site. Be sure to have cores taken in the woods and in a sunny location for comparision of different habitats.	Life, Its Forms and Changes, Harcourt, Brace and World Soil Ecology and Terrestrial Ecology, Prentice-Hall Field Study Manual for Outdoor Learning pp. 88-89 Region X films: Life Cycles (filmstrips) "Insects" National Geographic Films

KEY CONCEPTS Adaptation

GRADE LEVEL 7

CONTENT AREA Life Science

UNIT Classification and the Three Kingdoms: Seed Plants

OBJECTIVES

1. Determine the approximate age of a tree and the types of growing seasons it has endured. (3,4,5)

2. Compare and contrast the general tree shapes and leaf types of angiosperms and gymnosperms.

LEARNER ACTIVITIES

CLASSROOM:

1. A. Study the diagrams of cross-sections of trees. Teach the difference between good and bad growing seasons. The growth rings will be wider in good years and more narrow in lean years.

2. A. Learn the general characteristics of angiosperms and gymnosperms.

B. Do a lab that allows the dissection of flowers and any cones that are available should be studied.

CAMPUS:

1. Do a core sample of trees found on campus. The sample should be taken from the outside to the center of the tree. An instrument called an increment borer, often used by foresters, can be used to take the sample. After taking the core sample, be sure to plug the hole with a sealant. A tree does not produce growth rings until it is five years old. Use this formula to figure the tree's age: ____rings + 5 years = ____age.

2. Determine whether trees found near the campus are angiosperms or gymnosperms by listing their characteristics.

SITE:

1. A. Do a core sample of trees found at the site. Take the samples back to class and do a comparison of the campus samples and those found at the site.

B. On conifers (cone-bearing) trees count the rows, or whorls, of branches on the young trees.
Note: Most conifers grow one whorl of branches per year. To find the age use this formula: ____whorls + 5 years = ____age.

2. Have students draw a rough sketch of the shape of certain trees. Examples of angiosperms and gymnosperms should be pointed out.

RESOURCES

1. A. Focus on Life Science; Merrill pp. 187-189

B. Life Its Forms and Changes; Harcourt, Brace and World; pp. 135-142

C. Field Study Manual for Outdoor Learning; Burgess; p. 68

D. Environmental Education Instructional Activities Booklet; Oklahoma State Department of Education; pp. 38-40

2. A. Focus on Life Science; Merrill; pp. 185-186 (seed plants)

B. Life Its Forms and Changes; Harcourt, Brace and World; pp. 275-290

KEY CONCEPTS Pollution, Balance of Nature

GRADE LEVEL 7

CONTENT AREA Life Science

UNIT Classification and the Three Kingdoms: Algae and Fungi

OBJECTIVES

1. Recognize the characteristics of algae (1,2)
2. Identify common species of algae found locally. (2)
3. Observe the effects of pollution on algae. (2,3,4,5,6)

LEARNER ACTIVITIES

CLASSROOM:

1. A. Reading: LIFE, pages 4-8, 202-210; and/or FOCUS pages 201-208, 263-266.
   B. Use discussion, filmstrips, etc. to see algae characteristics. Talk about the importance of algae as a source of food and oxygen.
   C. Do mastery item 17-1, "When the Tide Turns Red", MAN AND THE ENVIRONMENT, page 243. Discuss factors that lead to algal blooms and the problems caused by them. Read "Can We Stop the Mysterious Red Tides", page 10; Science World, if available. (see resource column).
2. Lab: Have students prepare and look at wet mounts of fresh water samples. These can be brought in from different creeks, ditches, etc. by students.
3. Lab: Have students prepare and look at wet mounts of fresh water samples to which have been added table salt, weak acidic solution, and weak basic solution. Ask students to compare the algae in lab (2) to the algae in the three types of "pollutants" in lab (3).

CAMPUS:

2. Study algae samples from water on or near campus.
3. Get samples from polluted water sources for microscopic examination (on or near campus). Compare with fresh water samples and with artificially polluted samples (#3 under classroom).

SITE:

2. Collect water samples at the site for school classroom examination.
3. Look for evidences of pollution and the effect on algae at site water sources.

RESOURCES

Life, Its Forms and Changes, Harcourt, Brace and World

Focus on Life Science, Merrill and Co.

Science World, May 5, 1977; Vol. 33, No. 17

Man and the Environment, Houghton Mifflin

Region X films:
The Kingdom of Plants

Filmstrips:
1. Green Life
2. Simple Plants

National Geographic Films

KEY CONCEPTS Pollution, Balance of Nature

GRADE LEVEL 7

CONTENT AREA Life Science

UNIT Classification and the Three Kingdoms: Algae and Fungi (p. 2)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. Recognize the characteristics of fungi (2) 5. Identify common local species of fungi (2) 6. Show evidences of fungi acting as decomposers (2,3,5)	CLASSROOM: 4. A. Reading: LIFE, pages 234-242 and/or FOCUS, pages 266-275. Discuss characteristics of fungi and variety of external shapes. Stress the fact that fungi are different from other plants in that they cannot photosynthesize. Ask students for examples of ways that fungi affect our lives--both helpful and harmful. 5. Lab: Show and study common examples of fungi. 6. A. Discuss the importance of the decomposers in life cycles. B. Do problem 15-1, "Why Does Food Rot?" Man and the Environment, page 211. C. Do problem 15-3, "What Happens to Garbage and Trash?" Man and the Environment, page 216. CAMPUS: 5. Outdoor lab: Look for fungi. 6. A. Outdoor lab: Look for evidences of decomposition. Identify decomposers responsible, if possible. B. Make a compost pile for study. C. Put a rotting log on campus for study. SITE: 5. A. Identify places where fungi live (hosts) and see how they contribute to the environment as a whole. B. Have two stations: one in deep woods, one in a sunny location. Compare characteristics of each environment. Also compare types and populations of fungi at each station. 6. Look for decomposers and their effects: rotting wood, humus, loose soil, partially decayed leaves, etc.	

KEY CONCEPTS Energy, Interdependence, Adaptation, Conservation

GRADE LEVEL 8

CONTENT AREA Environmental Studies

UNIT Local Ecology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To allow students to see the changes of nature during the various seasons. (1,2) 2. To learn basic plant identification and gain familiarity with plant "key guides" (1,5) 3. To provide a method by which students will recognize individual animal tracks when encountered in the field. (2, 4)	CLASSROOM: 1. a. Have the students list the differences in forest appearance as the seasons change. Ask them to list the reasons for these changes. b. Make collage of different seasons using articles from magazines and newspapers. 2. Learn the basic terms used in identification of trees. These are: alternate, opposite, simple, compound, pinnate, palmate, buds, leaf scars, lenticels, bundle scars, leaf margins, leaflets, leaf shapes, general tree shapes. 3. Use reference books to find what types of terrestrial animals we might find in our area. Distribute dittos of various animals and their appropriate tracks. (These may be gathered by student research) CAMPUS: 1. List the changes that could occur on your campus during each seasonal change. If possible, take comparison photographs of the various seasons through a certain school window. 2. Use some of the trees found on campus to familiarize students with their new terms. Allow advanced students to try identifying the trees. (Use the provided tree guide. 3. Check your campus for various footprints. See if you can follow the trail for a short distance. Make inferences about the size and weight of the animal from its tracks. SITE: 1. Using a camera, have students take close-up and long-range pictures of certain areas during early fall. If possible, have the same students go back to the same places and take the same photos during late fall. Mount the photograph comparisons on cardboard and dis play them at your school.	1. A Question of Balance. Metropolitan Cooperative Education Service Agency. p. 57, 65 2. A Question of Balance Metropolitan Cooperative Education Service Agency. pp. 58-59 A Field Guide to Trees and Shrubs. Houghton Mifflin Company - Boston 3. Environmental Education Instructional Acti vities Booklet. Allied Printers and Publisher (Oklahoma State Dept. of Education) Terrestrial Ecology Prentice-Hall pp. 179-182

KEY CONCEPTS Energy, Interdependence, Adaptation, Conservation
GRADE LEVEL 8
CONTENT AREA Environmental Studies
UNIT Local Ecology page 2

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	SITE: 2. Distribute simple key sheets (attached) and allow students to identify various trees. Use a good field guide to trees and shrubs to key down to species. 3. Allow students to make plaster of paris casts for the various animal tracks they may find. (Procedure found in the listed resources.)	

KEY
LOCAL TREES, SHRUBS, AND VINES

1. Tree or shrub 2
1. Vine. 21

2. Tree with needle-liek leaves. 3
2. Tree with broad leaves. 4

3. Needle-like leaves, 6" to 9" long, in clusters of 3 . . . .
. . . . .Loblolly Pine
3. Needle-like leaves, 3" to 5" long, in clusters of 5 . . . .
. . . . Eastern White Pine

4. Leaves compound 5
4. Leaves simple 8

5. Leaves alternate. 6
5. Leaves opposite 7

6. Leaves once compound, mostly with 5 to 7 leaflets - no thorns
on trunk . . . . Hickory
6. Leaves twice compound, leaflets 2" to 4" long with finely
toothes margins - thorns present on trunk . . . .
. . . . Hercules Club

7. Leaflets distincly toothed, lenticels prominent . . . .
. . . . Elderberry
7. Leaflets minutely toothed, lenticels indistinct . . . .
. . . . Ash

8. Leaves opposite 9
8. Leaves alternate. 12

9. Leaf margin smooth. 10
9. Leaf margin lobed 11

10. Leaves unlobed, ends pointed usually more than 2" long
. . . . Dogwood
10. Leaves unlobed, ends rounded usually less than 2" long
. . . . Privet

11. Leaves 2" to 6" long, smooth on underside . . . .
. . . . Red Maple
11. Leaves 5" to 10" long, fuzzy on underside . . . .
. . . . Princess Tree

12. Leaves lobed 13
12. Leaves unlobed 16

KEY cont'd.
Local Trees, Shrubs, and Vines

13. Fruit or seed is an acorn 14
13. Fruit or seed is not an acorn 15

14. Leaves with smooth rounded lobes . . . .
. . . . The White Oaks
14. Leaves with bristle-tipped lobes . . . .
. . . . The Red Oaks

15. Leaves star-shaped and 5-lobed . . . .
. . . . Sweetgum
15. Leaves 4-pointed and notched at the tip. . . . .
. . . . Tulip Poplar

16. Leaves longer than broad. 17
16. Leaves as broad as long 20

17. Leaves singly toothed. 18
17. Leaves doubly toothed. 19

18. Leaves finely toothed-bark rough, red-brown or black-
lenticels easily seen on younger trees. . . . .
. . . . .Wild Cherry
18. Leaves coarsely toothed, gradually tapering to a point,
bark smooth gray - lenticels not easily seen. . . . . . .
. . . . Beech

19. Buds greenish-bark gray with vertical ridges giving a muscular
appearance - leaf base symmetrical . . . .
. . . . .Ironwood
19. Buds brown, bark brown or brownish-gray; leaf base not symmetrical . . . . Elm

20. Leaves heart-shaped, leaf margin smooth . . . .
. . . . .Redbud
20. Leaves heart-shaped, mitten-shaped, and 3 to 5 lobed. . .
. . . . Mulberry

21. Leaves simple. 22
21. Leaves compound. 23

22. Leaves alternate, vines with thorns . . . .
. . . . Catbrier
22. Leaves opposite, vines without thorns . . . .
. . . . Japanese Honeysuckle

23. Leaflets 3 . . . . Poison Ivy
23. Leaflets 5 . . . . Virginia Creeper

(Source: A Question of Balance, pp. 58-59)

KEY CONCEPTS Pollution, Carrying Capacity Conservation

CONTENT AREA Environmental Studies

GRADE LEVEL 8

UNIT Water Quality

OBJECTIVES

1. To determine the temperature, dissolved O_2 and pH of a given water sample.
2. To determine how these factors affect the life in the stream.
3. To determine the rate at which water flows in a stream.

LEARNER ACTIVITIES

CLASSROOM:

1. A. Discuss the purpose of running these tests.
   B. Discuss the results of the various water tests on the type of plants and animals.
   C. Have students do a report on the importance of water.
   D. Construct a mobil showing the relationships of all the factors tested.
   E. Examine man's dependence on water.

CAMPUS:

1. Test water sample from around campus and compare to sample taken at the site.
2. Classroom dry run of labs to give students experience with equipment.

SITE:

1. & 2. Lab A: Water Quality and Life
   a. Test at different times of the year.
3. Lab B: Water Flow Rates (see attached sheets)

RESOURCES

Terrestrial Ecology
pp. 15-20

Environmental Education Instructional Activities Booklet; Oklahoma State Department of Education, pp. 27-30

Field Study Manual for Outdoor Learning
p. 43

Question of Balance;
pp. 85-97

Metropolitan Cooperative Education Service Agency
p. 85

Pond Life; A Golden Natur
Guide, Golden Press N.Y.

Environmental Education Instructional Activities Booklet; pp. 35-37
"Sub Surface Fresh Water Organisms"
"Aquatic Insects"

Field Study Manual for Outdoor Learning;
pp. 52-57

KEY CONCEPTS Pollution, Carrying Capacity Conservation

GRADE LEVEL 8

CONTENT AREA Environmental Studies

UNIT Water Quality Page 2

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
		Nature Program: Meadows and the Forest Margin; National Audubon Society Nelson Doubleday Inc. Garden City, N.Y. 1956

SITE ACTIVITY (1,2)

Lab A: Water Quality and Life

OBJECTIVES:

1. To determine the amount of dissolved oxygen in the water.
2. To determine the acidity or alkalinity of the creek water.
3. To determine the temperature of the water and air at the site.
4. To discover how all of the above conditions affect the life of the stream.

MATERIALS:

- Sample bottles
- Test tube
- Univeral indicator or pH paper
- Dissolved oxygen kit
- Thermometer
- Field guide to aquatic life
- Screens (fine)
- Data sheet
- Information sheet

PROCEDURE:

1. As you approach the stream record, any information on the following:

   plants, animals, air, rocks, soil, water.

2. Determine the air temperature, and water temperature.
3. Obtain water samples in water sample bottles.
4. Identify as much plant and animal life as possible.
5. Take material back to lab for dissolved oxygen and pH test.
6. Observe samples under microscopes for any animal life.

DATA SHEETS

I. Record your observations about the stream environment.

PLANTS ______________________________

ANIMALS ______________________________

AIR ______________________________

ROCKS ______________________________

SOIL ______________________________

WATER ______________________________

II. Determine your location in regards to stream succession.

TYPICAL STREAM
(an example)

ITEM	HEADWATERS OF A STREAM	MID-REGION OF A STREAM	LOWER VALLEY OF A STREAM
Slope of stream bed	steep, fast, flowing	gentle	almost flat
Rocks in stream bed	large boulders	smaller rocks	silt sand
Temperature	Very cold	cool	warm
Amount of usable O_2	A lot of O_2	Enough for animals	O_2 is variable

Stream region is determined as ______________________________.

(Source: Field Study Manual for Outdoor Learning, p. 43)

III. Record the following information after processing all studies.

Location of Water Sample	Date	Time	Temperature Air	Temperature Water	pH	Dissolved Oxygen

(Source: Environmental Education Instructional Activites Booklet, p. 31)

IV. Describe the animals you found in the stream.

LOCATION OF ANIMAL	TYPE: NAME OR SKETCH *	NUMBER OF ANIMALS

* Label with a "M" if microscopic.

V. Compare data with other members of your class. What are your conclusions?

(Source: Environmental Education Instructional Activities Booklet, p. 28.)

INFORMATION SHEET

TABLE I. Temperature ranges supporting Aquatic Life.

TEMPERATURE		EXAMPLES OF LIFE
Greater than 68° (17°C) Warm Water		much plant life, many fish diseases, most bass, crappie, bluegill, carp, catfish, caddis fly
Less than 68° (17°C) cold water	Upper range 55° - 68° (13°C - 17°C)	some plant life, some fish diseases, salmon, trout, stonefly, mayfly, caddis fly, water beetle, striders
	Lower range 55° less (13°C less)	trout, caddis fly, stone fly, may fly

(Source: Environmental Education Instructional Activities Booklet, p. 30)

TABLE II: pH Ranges Supporting Aquatic Life

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Bacteria	1 - 13
Plants (algae, rooted etc.	6.5 - 12
Carp, suckers, catfish, some insects	6 - 9
Bass, crappie	6.5 - 8.5
Snails, clams, mussels	7 - 9
Largest variety of animals (trout, mayfly, stonefly, caddisfly)	6.5 - 7.5

(Source: Environmental Education Instructional Activities Booklet, p. 29)

TABLE III Dissolved Oxygen Requirements

Cold water - below 68° (17°C)	
salmon - trout	
spawning	7 ppmt
growth and well being	6 ppmt
Warm water - above 68° (17°C)	
bass & crappie	5 ppmt

(Source: Environmental Education Instructional Activities Booklet, p. 30)

Follow up questions for Lab.

1. What did you notice about the stream environment?
2. Was there a gravel bar?
3. Were there any plants on the bar? If so, what kind?
4. What did you notice about the rocks? Large or small?
5. Were there plants growing near the waters' edge? If so, what kind?
6. Were there any plants growing in the water?
7. How important is this stream to us?
    a. Describe in writing how you feel about man's effect on the aquatic environment at this site.
    b. Describe at least one action you can take in your everyday life to help improve the way water is managed.
        1. in your home
        2. in your community
        3. in your consumer habits
8. What did you find out about water from our investigations?
9. Why is water important to the ecosystem?
10. How would you summarize your investigations?
11. What methods and processes did we use?

CAPACITY AND SPEED MEASUREMENTS OF STREAMS

SITE ACTIVITY (3)

Lab C: Water Flow Rates

OBJECTIVES: To measure the speed at which a stream flows. To calculate the volume of water that flows across a given point per given time.

MATERIALS:

Stop watch
Meter stick
Stream
Items to throw in water
Data sheets one & two

CONCLUSION: Students can calculate the following:

1. How many liters of water flow past a given point every minute.
2. If we know that every person uses about 150 gallons of water every day, how many people could the stream supply per day?

DATA SHEET 1

Speed of water flow in a stream - Record your data in the blanks.

1. Measure a 30 meter distance along a straight part of the stream and mark this with wooden stakes.

2. Toss a small floating object (piece of wood) into the water at one of the stakes and record the length of time (in seconds) it takes to cover the 30 meter distance. (This may be done several times to get an average.)

   Trial #1 ________sec.

   Trial #2 ________sec. Average = ________seconds

   Trial #3 ________sec.

3. Divide the 30 meters by the average number of seconds it took for the object to float the measured distance. Your answer will be in meters per second. This is the speed of the water flowing in the stream.

   Speed = __________m/sec.

DATA SHEET 2

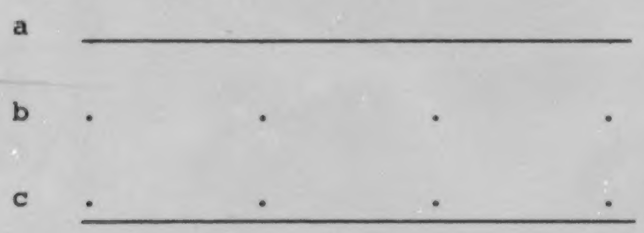
Capacity of a stream - Record your data in the blanks.

1. Find the average width of the 30 meter section of the stream. Measure four places (0 m, 10 m, 20 m, 30 m,) across the stream and record your results. Calculate the average width and record.

0 m = ________m
10 m = ________m
20 m = ________m
30 m = ________m

Average = ________m

2. Find the average depth of the stream. Measure the depth at three evenly spaced places across the stream as shown in the diagram. Repeat this at 10 m, 20 m, and 30 m along the 30 meter measured distance (twelve measurements). Record your results: Calculate the average depth by dividing the total measurement by 12.



0 meters: a = _____m, b = _____m, c = _____m
10 meters: a = _____m, b = _____m, c = _____m
20 meters: a = _____m, b = _____m, c = _____m
30 meters: a = _____m, b = _____m, c = _____m

Average depth = _______meters

3. Find the number of cubic meters of water that flows each second. Multiply the average width by the average depth by the number of meters/second the water flows.

A.W. X A.D. X m/sec. = cubic meters of water/sec.

_____m x _____m x _____m/sec. = cubic m/sec.

4. How many liters of water flow each second? There are 1000 liters in 1 cubic meter, so multiply your answer of the number of cubic meters/sec. by 1000 to get the number of liters/sec. of water that flows in the stream.

1 cubic meter = 1000 liters

______cubic m/sec. X 1000 liters/sec. = ______liters/sec.

(Source: A Question of Balance pp. 85-97)

KEY CONCEPTS Adaptation, Ecosystem, Balance of Nature

GRADE LEVEL 8

CONTENT AREA Environmental Studies

UNIT Nature's Natural Balance

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
. To classify, or recognize that the earth has many biomes. (2,3,4) . To see the purpose succession plays in nature. (1,2,3,4) . To recognize areas where plants are competing for sunlight. (1,2)	CLASSROOM: 1. Discuss the different terrestrial and water biomes and the types of animal and plant life that inhabit them. Examples of biomes are: desert, tundra, lake, grasslands, coniferous forest, shore line, tropical rain forest, tiaga, intertidal zone, savannahs, deciduous forest, ocean, river. If possible, look at the different vegetational areas of Texas. In what biome is Texas included? 2. Discuss succession and nature's role in succession. Answer the questions: Why is nature in different states of succession? How long does succession need to be complete? Does all succession require the same amount of time? 3. Discuss how certain plants block out much of the sunlight used by other plants. The shaded plants either adapt to little sunlight, send up vines to the sunshine or bend far to the side to reach the available sunlight CAMPUS: 1. Look at your campus and determine what biome it is found in. Has man changed it from its original state? 2. On the campus, look for things man does to prevent succession (such as removal of unwanted plants, clearing or painting to prevent the decay of a building.) Discuss what would happen if the building were completely unused for a number of years. Look for plants growing on rocks or between sidewalk cracks. Do these plants aid succession? 3. Observe what plants on your campus do when exposed to the shading by trees. What types of plants have adapted? How much light filters through the tree to the ground? Does this have any effect upon the plants beneath the tree?	1. A. Environmental Studies Program Book. Activities in Environmental Education EPD Consortium D-Region X, p.36 B. Investigating the Environment - Field Experience. Harris County Dept. of Education, p. 20 C. Terrestrial Ecology Prentice-Hall pp. 48-88 2. A. Field Experiences Investigating the Environment. Harris County Dept. of Education, pp. 22-27 pp. 38-39 B. Terrestrial Ecology Prentice-Hall pp. 41-45, pp. 182-187, pp. 210-213 C. A Question of Balance. Metropolitan Cooperative Education Service Agency p. 79-80

KEY CONCEPTS Adaptation, Ecosystem, Balance of Nature

GRADE LEVEL 8

CONTENT AREA Environmental Studies

UNIT Nature's Natural Balance p. 2

OBJECTIVES

LEARNER ACTIVITIES

SITE:

1. Examine areas appearing to be different from those around them. How many different habitats are found? What biome is our site found in?
2. a. Look for areas that have reached a point of climax succession (usually finding large trees) Look for areas that are not yet in a state of climax succession. Notice mosses and lichens growing on rocks. Notice low areas and the types of plants growing there. Can you see areas that once contained water?
   b. Select eroded areas and look for signs of any progression back to life (such as lichens, mosses, grasses, etc.). Have students describe the types of plants and the amount of topsoil found. Does the amount of topsoil have any correlation to the type of plants growing in an area?
   c. Examine several niches. Put a check (✓) for each plant you find. Make a double check (✓✓) for the dominant plant in each niche.
   (See attached sheet)
3. In ecological niches look for evidence of plants competing for sunlight. Have students make thistable on their paper:

Niche Description	Dominant Plant	Evidence of Competition

RESOURCES

D. Environmental Education Instructional Activities Booklet. Allied Printers and Publishers, Inc. pp. 43-44

3. A. Field Experiences Investigating the Environment. Harris County Deptartment of Education pp. 38-40
   B. Terrestrial Ecology Prentice-Hall pp. 187-192

SITE ACTIVITY (2C) WORKSHEET

Type of Plant	Name of Plant
A. Algae	
B. Fungi (mushrooms, puffballs powdery mildews and molds on plant leaves)	
C. Lichen (on rocks and bark of trees)	
D. Liverworts and mosses	
E. Gymnosperms (chiefly conifers)	
F. Grasses	
G. Shrubs	
H. Vines	
I. Trees	
J. Other	

Questions

1. The dominant vegetation in each niche may not be the natural climax vegetation for your area. Does the dominant vegetation keep other vegetation from growing?

2. How does the dominant vegetation affect the other vegetation nearby?

3. What might happen in each niche if the dominant vegetation were removed?

Note: Taken from Field Experiences, Harris County Department of Education

KEY CONCEPTS Interaction, Balance of Nature

CONTENT AREA Environmental Studies

GRADE LEVEL 8

UNIT Soil Studies

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To determine the temperature of a given soil sample. 2. To establish the pH of a soil sample and how it relates to plant growth. 3. To discover the relationship between plants and soil	CLASSROOM: 1. A. Discuss soil and its properties and how they relate to plant life. B. Research the different biomes and determine the soil conditions. C. From the A & M extension center contact a resource guest speaker on local soil requirements. CAMPUS: 3. Lab A: Where does soil come from - (attached sheet) SITE: 1. Lab B: Soil temperature (attached) 2. Lab C: Testing for soil pH. (attached)	1. Terrestial Ecology pp. 27-29 Environmental Education Instructional Activities Booklet p. 15, p. 32; Oklahoma State Department of Education, Allied Printers and Publishers A Question of Balance Metropolitan Cooperative Educational Service. 2. A Question of Balance p. 79, p. 84; Metropolitan Cooperative Education Service

CAMPUS ACTIVITY (3)

Lab A: Where does soil come from
Campus Activity

OBJECTIVE: To observe that soil is held down by plants. To observe that soil is lost through carelessness and that loss can be prevented.

MATERIALS:
Drawing paper
Spatula
Ruler (m m)
Graph paper

PROCEDURE:
1. Locate an eroded area on campus.
2. Locate, nearby, an area with abundant plant life.
3. Working from the center out, look for the following:
   a. any signs of progression back to life
   b. amount of top soil found

DATA: Graph the amount of top soil compared to the amount of plant life.

CONCLUSION:
1. What procedures would be needed to restore the eroded area?
2. Why is the prevention of erosion important to you in your everyday life?

EXTRA ACTIVITIES: Set up a stream table.
   a. reconstruct the scene
   b. work on ways to control it

SITE ACTIVITY (1)

Lab B: Soil temperature

OBJECTIVE: To determine the temperature of a given sample of soil.

MATERIALS:
Soil thermometers
Data sheet

PROCEDURE:
1. Record the temperature of soil sample from several areas.
2. Note the type of plant growth from each area.
3. Research and determine when the growing season is for your area.

DATA SHEET

SAMPLE	TEMPERATURE	PLANT CONDITIONS

CHART OF TEMPERATURE DISTRIBUTION

SOIL TEMPERATURE	CONDITIONS DURING GROWING SEASON
Less than 40°F (4°C)	No growth
40°F to 65°F (4°-18°C)	Some growth
65°F to 70°F (18°-21°C)	Fastest growth
70°F to 85°F (21°-28°C)	Some growth
Above 85°F (28°C)	No growth

(Source: Environmental Education Instructional Activities Booklet, p. 21)

SITE ACTIVITY (1) cont'd.

CONCLUSION: Graph the results:
.soil temperature compared to plant growth

What other conditions can you think of that would limit plant growth?

Extra soil activities are found in:

Environmental Education Instructional Activities Booklet: Oklahoma pp. 15-26

Field Study Manual for Outdoor Learning
Minneapolis, Minn. pp. 19-35

SITE ACTIVITY (2)

Lab C: Testing for soil pH and how it affects plant growth.

OBJECTIVES:
1. To determine the soil pH.
2. To examine the fauna of a certain area as a result of pH.

MATERIALS:
- Collecting containers
- Spoon
- Graduate cylinder
- Flasks
- Corks or rubber stoppers
- pH paper and scale
- Data sheet

PROCEDURE:
1. Collect several types of soil or soil from a cross section of a given area. Make note of the plant life listing as many kinds as possible.
    a. Place a teaspoon of soil in a flask and add 100 ml of distilled water.
    b. Stopper and shake flask vigorously for several minutes. Set aside to settle.
    c. After 10 minutes test the upper layer of water with the pH paper.
    d. Record your results on your data sheet
    e. Compare your results with the others in class.

DATA: Compare your pH test to the type of plants. (see below)

TYPE OF PLANT (grass, shrub, etc)	Sample #	pH	Condition of plant
	1		
	2		
	3		
	1		
	2		
	3		
	1		
	2		
	3		

OR

SITE ACTIVITY (2) cont'd.

PLANT	CONDITION OF PLANT	pH	DESCRIPTION OF AREA

CONCLUSION:

1. Did you find a difference in pH requirements for each plant.
2. Why is lime sometimes added to the soil?
3. Why is vinegar sometimes added to the soil?
4. Why is it important to know how acidic or basic your soil is?

OUTSIDE ACTIVITY: Interview a horticulturist or visit a green house to find out how they maintain proper pH for optimum plant growth.

pH 1 to 4.5	too acid for most plants
pH 4.5 to 5.0	rhododendrons, camellias, azaleas, blue berries, fern, spruce
pH 5.0 to 6.0	pines, firs, holly, daphne, spruce, oaks, birch, willow, rhododendron
pH 6.0 to 7.0	maple, mountain ash, pansy, asters, peaches, carrots, lettuce
pH 7.0 to 8.0	beech, mock orange, asparagus, sage brush
pH 8.0 to 14	to basic for most plants

(Source: Environmental Education Instructional Activities Booklet, p. 20)

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. The student will match phrases representing measurements of weather with their proper terms. (6)	CLASSROOM: 1. Vocabulary a. Thermometer reading b. Wet and dry bulb reading c. Anemometer d. Barometric pressure e. Dew point f. Cloud cover g. Precipitation	Merrill 161 Allyn and Bacon 248-263 *General Information she attached.
	CAMPUS: 1. Lab: Daily, and Long Range Weather Observation Lab. Skills: Students should be able to use all of the weather instruments.	
	SITE: 1. Lab: Take a series of readings at the site and compare to the readings taken at school.	*Use same lab sheet as i Campus activities. Environmental Education Instructional Activities Booklet

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	GENERAL INFORMATION ABOUT WEATHER 1. Temperature will usually rise if the wind is from the south or west in winter and east in summer. Temperature will decrease if the air pressure rises rapidly. 2. Rising air pressure tells of warm air of a high pressure area and fair weather; falling air pressure, of a low pressure area and poor weather. 3. Rainfall is measured by the depth of water that would lie on the ground if none of the rain escaped. Rainfall is reported by the amount of liquid which fell in a given length of time. 4. Wind speed will indicate how soon a change will occur. 5. Warm air can hold more moisture than cold air. As moist, warm air rises, it slowly cools until it eventually reaches a temperature at which the air is saturated. Further cooling forces some of the water to condense out as water droplets. Low humidity usually means dry air and fair weather. High humidity means much moisture in the air and the presence of a low pressure area or approaching storm.	

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. The student will interpret the meaning of the statement that the sun is the primary source of heat. (1)	CLASSROOM: 2. A. Merrill: Section 9:5 (p. 169) B. Allyn and Bacon: 1. p. 274 (only introductory paragraph). 2. p. 169 (3rd paragraph--absorption is the key to transfer.) 3. p. 279 (2nd paragraph--absorption). CAMPUS: Lab: Radiant Heat Lab Objective: To simulate sun energy in relation to distance from the sun. (See attached sheet)	ESCP Books and Teachers Manual

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

CAMPUS ACTIVITY (2) RADIANT HEAT LAB

Purpose: How does distance affect the amount of heat received from the sun.

Materials:
Lamp
200 Watt bulb
4 cans painted black (flat)
4 thermometers

Procedure:
1. Set up lamp.
2. Arrange cans so that they are the following distances from the lamp
   a. -6in b. -12 c. -18in d. -24 in
3. Set them up so that no can is in a shadow (an arc).
4. Place the thermometer in the can.
5. Turn on lamp.
6. Take temperature readings every 2 minutes for 15 minutes.
7. Fill in the data

DATA:

	Can 1	Can 2	Can 3	Can 4
Begin	BT_____			
Finish	ST_____			

ST - BT = ___ ST - BT = ___ ST - BT = ___ ST - BT = ___

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	Conclusion: 1. Which can show the greatest overall temperature change?__________________________. 2. Which can would show ideal living situations if it were a planet?____. 3. What can you conclude from this experiment concerning radiant heat?	

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. Given the statement that unequal heating causes wind, the student will describe world wind systems and local winds giving reasons for their occurance. (1)	CLASSROOM: 3. A. Merrill 1. 10:1 (p 182) 2. 10:2 (p 185) B. Allyn and Bacon 1. p. 284-285 2. p. 290-291 (Include: Corioles effect, major wind belts, jet stream.) CAMPUS: 1. Diagram - Map of major wind belts labeled by students. 2. Lab: Local Wind Lab. (Differential Heating).	

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. The student will demonstrate his knowledge of unequal heating by identifying the various methods that produce this effect. (1)	**CLASSROOM:** 4. A. Merrill Section 9:6. 1. (p. 173), 168-169 2. p. 275. B. Allyn and Bacon C. Concepts: 1. inclination 2. earth's surface variances 3. cloud cover 4. greenhouse effect **CAMPUS:** 4. Demonstration - radiometer **SITE:** 4. Lab: Students will explore unequal heating at various areas: (See attached sheet)	

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

Site Activity (4)

Lab: Unequal Heating

Purpose: Does vegetation affect unequal heating.

Material: Thermometers.
Chart.

Procedure:
1. Take 2-3 readings in a wooded area.
2. Take 2-3 readings in an open area.

DATA:

WOODED	OPEN
1. ________	1. ________
2. ________	2. ________
3. ________	3. ________

Conclusion:
1. Does vegetation affect temperature?
2. Could these conditions create a breeze - how?
3. Describe plant life in both areas.
4. Why is the plant life different in both areas?

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. The student will compare the 3 methods of heat transfer. (1)	CLASSROOM: 5. A. Merrill: 170-172. B. Allyn and Bacon: 278-280 There are three methods of transfer: radiation, convection, and conduction.	

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. Given incomplete statements concerning weather phenomenon, the student will select from a list of alternatives the phrase which best completes the statements. (1).	CLASSROOM: 6. A. Merrill p. 188-192. B. Allyn and Bacon p. 253-258. p. 286-289. p. 292-297. C. Include: 1. How clouds are made. 2. Air masses. 3. Warm and cold fronts. 4. Thunderstorms, tornados, hurricanes. 5. Precipitation and condensation. CAMPUS: 6. Whenever one notices a front coming in--take the class outside and record all the differences as the front passes (temperature, wind, precipitation, relative humidity).	

KEY CONCEPTS Interdependence, Adaptation, Energy
CONTENT AREA Earth Science
GRADE LEVEL 8
UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
7. Utilizing provided weather maps, the student will interpret data to give a forecast. (6).	CLASSROOM: 7. A. Merrill p 188 (additional references needed) B. Allyn and Bacon p 298-299 C. Include: 1. Explanations for map symbols reading. 2. General front movement and effects. 3. General weather associated with pressure areas. CAMPUS: 7. A. Weather Map Lab. B. Practical question sheet - attached. SITE: 7. A. Advanced students - Have students gather information on weather conditions from their own instruments and attempt to give a forecast from that information.	Field manual for Outdoor studies.

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CAMPUS: B. Determine which month has the fewest number of weather changes (extreme) based on personal observation. SITE: B. Identify and test relationships between weather and other factors such as the activity of insects and birds.	Tips and Tricks 'n Outdoor Education.

KEY CONCEPTS Interdependence, Adaptation, Energy

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Meteorology

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES

CAMPUS ACTIVITY (7B)

Practical Question Sheet:

Below are listed a series of questions a student should keep in mind before forecasting the weather. (To be included with the weather map Lab).

1. Was the grass wet with dew this morning?
   a. Did it rain?
   b. Was it clear?
2. If there was a low fog that cleared by noon. . .
   a. Was the upper sky clear?
   b. Was the upper sky cloudy?
3. If a southwest wind had been blowing for a couple of days. . .
   a. Did they bring a rain storm?
4. How soon after you saw a ring around the sun or moon did it rain?
5. What does an easterly wind bring during the summer?
   What does an easterly wind bring in the winter?

KEY CONCEPTS Resource Distribution

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Topographic Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. The student will be able to establish a unit of measurement and use it to map a given area. (6).	CLASSROOM: 1. A. Review a "unit of measurement" and what it is used for. B. Establish the criteria for making a unit of measurement. CAMPUS: 1. Have the students pace off a known distance - i.e. 20 feet - and divide their number of steps into the known distance to find out how long their step is. SITE: 1. Have the students divide up into groups and pace off a plot on the site: a. determine the distances b. plot a map c. establish a key (See attached sheet)	

KEY CONCEPTS Resource Distribution
GRADE LEVEL 8
CONTENT AREA Earth Science
UNIT Topographic Maps.

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. Given degrees of latitude and longitude, the student will identify the locations on a globe or map and identify the corresponding degrees of latitude and longitude. (6).	CLASSROOM: 2. A. Merrill p. 28-29. B. Allyn and Bacon p. 376-377. C. Include: prime meridian, equator, international date line. Teach degrees and minutes before class. D. Lab-Latitude and Longitude.	

KEY CONCEPTS Resource Distribution

GRADE LEVEL 8

CONTENT AREA Earth Science

UNIT Topographic Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. Given a hypothetical situation concerning time and position for a specific location, the student will give corresponding time and position for other location (6).	CLASSROOM: 3. A. Merrill p 28-29. B. Allyn and Bacon p. 378-381. C. Do "time problems" listed in texts.	

KEY CONCEPTS Resource Distribution

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Topographic Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. Given a topographic map the student will demonstrate his ability to analyze and interpret it by answering questions based on the information it contains. (5 and 6).	CLASSROOM: 4. A. Have students learn symbols and colors for topographic maps. a. roads b. railroads c. buildings d. rivers e. lakes f. marshes g. depressions h. sand i. glaciers j. levees k. benchmarks l. vegetation. B. Lab- Topographic Symbols Lab. (See attached sheet) SITE: 4. A. Have students take the map they paced off and draw in the features listed above as appropriate with the correct symbols.	Obis # 1 field activity

KEY CONCEPTS Resource Distribution

GRADE LEVEL 8

CONTENT AREA Earth Science

UNIT Topographic Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
5. Given a topographic map, the student will identify the geographic features. (5-6).	CLASSROOM: 5. A. Discuss geographic features and how they are portrayed topographically a. glacial valley b. gentle slope c. steep slope d. hill e. mountain f. canyon g. marshy lowland h. cliff i. Karst topography j. plains k. volcano SITE: 5. A. Topographic map lab. (See attached sheet.) B. Have students identify the major feature, listed above, on the map and draw in correctly.	

KEY CONCEPTS Resource Distribution

GRADE LEVEL 8

CONTENT AREA Earth Science

UNIT Topography Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
6. The student will interpret the meaning of contour lines and intervals for a given topographic map. (6).	CLASSROOM: 6. A. Merrill p. 344-345. B. Allyn and Bacon p. 212-213. C. Vocabulary a. contour line b. contour interval c. index contour line CAMPUS: 6. A. Contours lab (See Attached sheet.) B. Practice lab with equipment. SITE: 6. A. Have students draw in contours on established map.	

KEY CONCEPTS Resource Distribution

CONTENT AREA Earth Science

GRADE LEVEL 8

UNIT Topography Maps

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
7. Given two points on a topographic map, the student will make a cross profile of the area on a line between two points. (6).	CLASSROOM: 7. A. Merrill p. 346. B. Allyn and Bacon p. 218. CAMPUS: 7. A. Practice drawing profile from a map. (See attached sheet). SITE: 7. Draw profile of given area (see attached sheet.)	Resource: Environmental Education Instructions Activities Booklet

SITE ACTIVITY (1)

LAB - Measurement

PURPOSE: To establish measurement without tools. (For large areas where measures are impractical)

MATERIALS: Tape measure, stakes.

PROCEDURE:

1. Measure a given area in a straight line and mark at both ends with a stake.
2. Have students divide into groups and pace off the given length.
3. Record the number of steps taken. This is the basis of your unit of measurement.
4. Go to the site. Have students pace off a given area.
5. Key the area down and plot a map to be kept for future additions.

DATA:

1. Given distance = ______ m.
   Number of steps for given distance = ______.
2. Number of steps of designated area = ______ x ______.
   The determined size of plot = ____ m x ____ m.

i.e. 1. Given distance = 10 m.
Number of steps for given distance = 14 steps
Plot
2. Number of steps for plot = 28 steps x 21 steps
Size of plot = 20 m x10.5 m.

CONCLUSION:

1. Did you establish a unit of measurement?
2. How accurate is your unit?
   positive points:
   negative points:

Technique #2

PROCEDURE:

1. Pace off given distance 2x. (a question of balance)
2. Record number of steps each time.
3. Fill in the following chart.

DATA:

1. Number step 1x ____________
+Number step 2x ____________
Total Number = ____________

Given distance ____________ ÷ Number of steps total ____________ = Distance of 1 step. ____________

2. Pace of plot

Number steps for plot ____________ X size of 1 step ____________ = total distance ____________

SITE ACTIVITY (4)

LAB - Topographic Symbols

Obis # 1

Purpose: To apply knowledge of topographic symbols to an unknown.

MATERIALS: List of topographic symbols
Map with dimensions plotted

PROCEDURE:
1. Take map and go to site.
2. Have students walk around their plot and look for key symbols.
3. Locate position for symbols by pacing off distances.
4. Plot symbols.
5. Keep map.

DATA: Which features were you able to find?
List the symbols for each.

CONCLUSION: Were you able to plot your symbols?
Describe your technique.

SITE ACTIVITY (6) Obis # 1

LAB - Drawing Contours

PURPOSE: To be able to draw contours on a map.

MATERIALS:
1. rod (range pole)
2. level (sighting device)
3. map with dimensions and symbols

PROCEDURE:
1. Select a starting point in plot.
2. Establish a baseline to work form.
3. Moving out from baseline 50 ft. take reading.
4. Move 50 ft. more, take another reading.
5. On map plot x's to show where readings were taken.
6. Record elevations in data section.
7. Plot information on map.

DATA: Records of elevations

CONCLUSION: Plot on map.

SITE ACTIVITY (7)

LAB - Profile

PURPOSE: To be able to establish a profile between two given points.

MATERIALS:
2 stakes
3 contours as drawn

PROCEDURE:
1. Mark off a given area in your plot.
2. Study your contours and observe the land.
3. Draw profile.

DATA: Drawing of profile.

CONCLUSION: What is a profile?

KEY CONCEPTS ____________________ CONTENT AREA Biology

GRADE LEVEL 10 - 12 UNIT Protista

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To identify single-celled plants and animals. 2. Why is the existence of these organisms important to us? To other living organisms?	**CLASSROOM:** Discuss: habitat reproduction structure roll in biotic community classification Maintain: Culture jars, hay infusions **CAMPUS:** 1. Collect and observe water samples from any standing water on campus. 2. Soil study, examine soil samples for protist. **SITE:** Soil and water samples will be examined for protists (microscope). How many organisms live here? O.B.I.S. I?	*Biology*, Small - Wood and Green

KEY CONCEPTS ______________

CONTENT AREA Biology

GRADE LEVEL 10 - 12

UNIT Protista

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To observe the place and importance of lichens and fungi in community succession and organic cycles.	CLASSROOM: Discuss the variety of fungi and lichen, and their parts and functions. Review organic cycle and succession. Examine samples of lichen and fungi.	
	CAMPUS: Look for evidence of lichen and fungi around the campus - list factors present that affect their growth.	Lichen Looking O. B. I. S. II
	SITE: Observe the lichen and fungi present, list factors that affect their growth, observe their affect on the environment - compare their presence with the point in common succession for that area. Lichen Looking O.B.I.S. II	

KEY CONCEPTS Animal Niches

GRADE LEVEL 10 - 12

CONTENT AREA Biology

UNIT Animal

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM:	
1. To become familiar with the various niches available for wildlife near an urban community.	1. Discuss local habitat available for wildlife. 2. Collections (from home) of nests, logs with holes, etc. 3. Draw charts illustrating dependence of living on the living.	Text, Field Guide County Agent
2. To increase the student's ability to make observations and record his findings.	CAMPUS:	
3. To become aware of the continuous interaction between the community and living things and these are associated with specific niches.	3. Sketch of photograph microniches on campus lawn, label and explain various aspects and functions of structures. Observe shrubs and trees for insect or animal populations, record activities.	Aid from photography class.
	SITE:	
4. To compare difference and similarities between communities of living things.	2. Team observation of various communities (swampy areas, forest floor, pasture grass, soil sample etc.) 4. Locate and record evidence of food cycle. 2. Chains, web etc. compare with different areas.	

KEY CONCEPTS ____________

GRADE LEVEL 10 - 12

CONTENT AREA Biology

UNIT Animal - especially worms & insects

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. To determine the relative abundance of small living things in soil samples taken from several soil samples.	**CLASSROOM:** Identification of local invertebrates found in soil.	Biological supply Specimens collected locally. Fish bait stoves (crickets, worms)
	CAMPUS: Examine soil samples in the lab obtained from specific areas of campus.	Identification guides.
	SITE: Take soil samples and examine for bacteria and invertebrates. Examine specific samples from forest floor at various depths and do population study.	

KEY CONCEPTS Characteristics of Fish

CONTENT AREA Biology

GRADE LEVEL 10 - 12

UNIT Animals (aquatic)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
	CLASSROOM:	
3. To observe and identify aquatic life.	Maintain an aquarium containing native varieties of aquatic life. Identify local varities of fish, amphibians, turtles.	Pet shop quides to aquarium maintenance. Field guides
	CAMPUS:	
	Key out small fish from standing bodies of water. Do water plant study, identify and propagate in classroom situation.	
	SITE:	
	Take water samples, examine for protozoans; make hay infusions; Seine for fish - identify various species of fish.	Field Guide The Protozoa

KEY CONCEPTS Bird observation

GRADE LEVEL 10 - 12

CONTENT AREA Biology

UNIT Animals (birds)

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
4. To observe activities of birds and classify (identify) them.	CLASSROOM: Discuss habitat, feeding habits of birds familiar to this area. Migratory habits. Collect and observe various abandoned nests.	Field guide.
	CAMPUS: Bird feeders on campus.	Shop areas for material and construction.
	SITE: Bird watch: keep a diary of species and habits of each. Observe nesting habits, feeding areas, etc.	Roger Tory Peterson Field Guide to the Birds of Texas

KEY CONCEPTS ____________

CONTENT AREA Biology

GRADE LEVEL 10 - 12

UNIT Evolution

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
Comparison of niches available in two or three different environment areas and analysis of the different adaptations to similar niches.	CLASSROOM: Discussion of Darwin's finches and how they adapted to similar and different niches. Discussion also of niche competition. (wallaby and rabbit)	
	CAMPUS: Section off areas to analyze the niches and organisms in area - (area with tree, area without, area near pond etc.)	
	SITE: Section off areas to analyze the niches and organisms in area (Use areas similar to campus ones and some others if different) Compare analysis of campus with site and explain difference or similarity.	Animals in a grassland O.B.I.S. I

KEY CONCEPTS ______

CONTENT AREA Biology

GRADE LEVEL 11 - 12

UNIT Evolution

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
To observe adaptations in plants or animals that give organisms an advantage in their environment.	**CLASSROOM:** 1. Discuss adaptations and natural selection in survival. 2. Observe classroom specimens for adaptations. a. Show adaptation is color change in andles lizards. b. Show plant adaptations to variation in amount of available light .	Local zoos and museums U.T.D. for speakers.
	CAMPUS: 1. Observe campus lawn for competition and adaptation for survival among weeds and grass. 2. Observe reactions of insects to various attempts to control.	Grounds keepers.
	SITE: Look for evidence of adaptations of organisms for survival. (Vines growing on trees for sunlight; plants adapted to shade or sun; camouflage in snakes, lizards, birds, buffalo etc.)	

KEY CONCEPTS ____________

CONTENT AREA Biology

GRADE LEVEL 10 - 12

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
1. To illustrate need for seed dispersal in plant survival.	**CLASSROOM:** Become familiar with the various types of seed adaptations.	Field guide to Texas Peterson Series
	CAMPUS: Examine the plants around the school for any seeds that might be found there.	Weeds of Texas Texas Department of Agriculture County Agent
	SITE: Examine, identify and sketch the seeds found at the site. 1. Observe acorn re-location by squirrels. 2. Observe milk weed seed dispersal. 3. Explain cocklebur and stick-weed clinging to rocks.	

KEY CONCEPTS ______

CONTENT AREA Biology

GRADE LEVEL 10 - 12

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
2. Show dependence of plants on insects for pollination.	**CLASSROOM:** Awareness of the various aspects of plant pollination. Seed, fruit and dispersal mechanisms of various plants. **CAMPUS:** Observation stations near concentrations of dandelions and buttercups. Record data and confirm concepts discussed in class. **SITE:** Observe flowering plants and made notes of the types of insects associated with each plant species. Students might also capture insects and examine them for pollen then release.	Local beekeepers

KEY CONCEPTS Diversity and Succession

GRADE LEVEL 10-12

CONTENT AREA Biology

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
3. To become aware of the diversity, succession and interdependence in a plant community.	**CLASSROOM:** Learn how to identify plants by use of a taxonomic key.	Weeds from campus lawn. Grow plants in class.
	CAMPUS: Identify the plants around the school and note the environment in which each lives. Map areas as to predominate plant species.	Slides and photos of areas of campus flowers.
	SITE: Same as campus	

KEY CONCEPTS ______

GRADE LEVEL ______

CONTENT AREA Biology

UNIT Plants

OBJECTIVES	LEARNER ACTIVITIES	RESOURCES
To observe the diversity of plants through a leaf study.	**CLASSROOM:** Learn the different kinds of leaves according to shape, veins, etc. and how to classify trees and plants using leaf structure. **CAMPUS:** Make a silhouette sketch of the leaf with vein pattern for the leaf and plants on campus. **SITE:** Same as campus. Compare the leaves from campus and site for native and man introduced species.	

C. Teaching idea sources

   1. Pre- and post site activities
   2. Ideas from other districts
   3. Articles from the media
   4. Films and books available

The following is Environmental Studies equipment purchased with Title IV C funds. Please reserve it and check it out as needed for on-campus or site activities.

TO MEASURE LENGTH:
    Measuring Tape (inch/feet)
TO MEASURE D.B.H:
    Diameter tape (4)
TO SURVEY:
    Transit
    Tripod
    Stadia Pole
TO LEVEL OR MEASURE HEIGHT:
    Clinometer
TO TEST SOIL:
    Soil Thermometer (2)
    Soil Sampler
TO TEST WIND:
    Anemometer (velocity)
    Wind meter (direction) (4)
TO CORE TREE:
    Increment Borer
    Bee's Wax
    Box to Hold Treecores
    Phloroglucinol
TO SEE DETAIL:
    Magnifiers (29)
    Microscopes (10) - mirror
TO CATCH SMALL ANIMALS:
    Animal Trap
TO FIND DIRECTION:
    Compass (12)
TO LABEL TREES AND SMALL PLANTS
    Aluminum tags (300)
TO CUT PLANTS:
    Machete
    Hatchet
    Handsaw
TO GIVE FIRST AID:
    First Aid Kit
    Snake Bite Kit
COMING IN SOON:
    Air Pollution Kit
    Water Pollution Kit
    Soil Test Kit
    Telescope (2)

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D. Feedback

Fill out and return this form to curriculum within 10 days after taking your class to the site.

FEEDBACK FORM

To continually improve the Plano I.S.D. Outdoor Learning Center and Environmental Education Program, it is important to have feedback from the classroom teachers. Please fill in this form and return it to Pam Hamilton within 10 days of taking your class to the center.

---

name ____________ grade or subject ____________ date ________

1. The scheduling and transportation was:

poor 1 2 3 4 5 6 7 excellent

2. The pre-site visit was:

didn't have 1 2 3 4 5 6 7 excellent

3. The post-site visit was:

didn't have 1 2 3 4 5 6 7 excellent

4. The condition of the trails was:

poor 1 2 3 4 5 6 7 excellent

5. The trails and stations could be improved by:

____________ ____________

____________ ____________

6. Additional equipment needed for the center:

____________ ____________

____________ ____________

7. List any animals seen to help us keep a running inventory.

8. List or explain any interesting or new phenomena observed.

9. Please share one good activity that you have done this year either in class, on your school ground, or at the center.

10. Additional comments or suggestions:

Variable Stations

Supplement to the Plano Independent School District Outdoor Learning Center Trail Script.

This is a list of many of the features that are found seasonally or at varied locations on the trails of the Plano Outdoor Learning Center. This listing is by no means comprehensive, but contains the features that are most often asked about by students.

It is hoped that this information and its key will be an aid to the inevitable questions that will be encountered while enjoying the beautiful trails.

Key to Variable Stations

Holes/Depressions
- Large holes, burrow-like, in ground A1
- Small diggings, in ground A1
- Small holes in trees:
  - accompanied by saw dust F1, F28
  - no saw dust, in bois d'arc trees D3
- Tiny depressions in sandy soil, cone shaped, at amphitheatre F15
- worm-like trails on tree F28

Piles of Saw Dust under logs, on leaves F1

Growths on Trees/Fallen Logs
- Brown, folded I3
- Shelf-like, brown, black I1
- Green, mossy, furry I4
- Crackly, gray-green I2

Pill-bug shaped, hard brown mass F25

Webs
- Sheet-like, over grass, twigs G1, G2
- Wagon wheel shape, suspended between branches G3
- Covers leaves of tree, with worms F7
- Tent in fork of branches, with worms F12

Brown, crusty insect skins, hanging on branches, bark F16

Frothy Bubbly mass on plant stems F26

Ball-shaped nests high in trees A3

Foot prints in mud, resembling tiny human handprints A2

Ball-shaped objects
- Hollow, crusty brown shell J6
- Hard, green hull; 1" J4
- Hard, brown hull; 1 1/2" J7
- Greenish to brownish nuts, some having brown caps J1
- Greenish to purplish fruits; 1" J5
- Purple skins, hollow fruits; 1/2" J2

Sounds
- "Caw, caw, caw" D1
- "Tat-tat-tat-tat" D3
- Heavy, loud, rasping sound filling summer air F16

Vines
- Heavy, brown, woody J2
- Green to brown, with thorns J8

Blue-tailed lizzard B2

Roly-Poly in humus, under logs E2

Gray beetle/black "eyes" F17

Darting on Surface of water F13, F14

Low-flying Insects
    Green beetle, humming F20
    Black, will cling to trees F27

Wild Flowers (by color of blossom)
    Yellow - large/brown, seedy center H11
        med/black center H1
        med/tipped in red H4

    Blue - H3
    Reddish, purple - H5
    Green-white - H7
    Yellow-White, on vine-like plant - H6
    White - hairy leaves and stems - H2
        tiered blossoms, may have red berries - H9
        umbrella-like head, small individual blossoms - H13
    Pink to yellow, spotted leaves - H12
    Pink to white, onion-like stems - H14

Outline of Variable Stations

A. Mammals
  1. Armadillo
  2. Racoon
  3. Squirrel

B. Reptiles
  Lizards
    1. Broadhead Skink
    2. Eastern Skink
    3. Fence Lizzard

  Snakes
    4. Copperhead
    5. Green

C. Amphibians
  1. American Toad
  2. Cricket Frog

D. Birds
  1. Crow
  2. Mocking Bird
  3. Sapsucker (yellow-bellied)

E. Crustaceans
  1. Crayfish
  2. Pill Bug (Roly Poly)

F. Insects
  Bees/Wasps/Ants
    1. Carpenter Ants
    2. Cicada Killer
    3. Cow Killer
    4. Honey Bee
    5. Paper Wasp

  Butterflies/Moths
    6. Angel Wings
    7. Fall Web Worm
    8. Monarch
    9. Sphnix Moth
    10. Sulfur Butterfly
    11. Swallow Tails
    12. Tent Catapillar

  Water Bugs
    13. Water Striders
    14. Whirligig Beetles

  Beetles/Flying, Hopping, Burrowing Insects
    15. Ant Lions
    16. Cicada (locust)
    17. Click Beetle
    18. Dragon Flies/Damsel Flies

19. Grasshoppers
20. Green June Beetles
21. Ichneumon Flies
22. June Beetles
23. Lady Bird Beetle
24. Mosquitoes
25. Praying Mantis
26. Spittle Bugs
27. Stink Bugs
28. Wood Borers

G. Spiders/Scorpions
1. Sheet Web Spiders
2. Funnel Web Spiders
3. Orb Web Spiders
4. Scorpions

H. Flowering Plants
1. Black-eyed Susans
2. Bull Nettle
3. Day Flower
4. Firewheel
5. Iron Weed
6. Japanese Honey Suckle
7. Milk Weed
8. Poison Ivy/Poison Oak
9. Pokeweed
10. Stinging Nettle
11. Sunflower
12. Trout Lily
13. Wild Carrot
14. Wild Onion

I. Non-Flowering Plants
1. Bracket Fungus
2. Lichen
3. Jelly Fungus
4. Moss
5. Mushrooms

J. Nuts/Berries/Galls/Vines
1. Acorns
2. Grapes
3. Green Insect Galls
4. Pecan
5. Plum
6. Oak Apple Gall
7. Walnut
8. Green Briars

Mammals

A1 Armadillo

A mammal that digs large burrows in earth and mounds dirt on one side of the opening. One can tell if the burrow is not being used at the time by the presence of spider webs, leaves, and debri cluttering the entrance. No resident armadillo would allow these to gather. These diggings in fallen leaves and soil looking for grubs and other insects. They can roll up into a ball, with their armour to protect them, or may scratch with their formidable claws used in digging. Have good senses of hearing and smell, but poor sight.

A2 Racoon

Mostly nocturnal animals, meaning that they do most of their feeding at night. Prefers wooded areas near water as frogs and crayfish are favorite foods. Prints in mud look like minature human hand prints, usually left during hunting, or as he comes to do his ritual washing of food in the stream before eating.

A3 Squirrels

Acorns are a major part of diet, and may bury nuts as a security against hunger. Many nuts are never recovered and so this animal helps establish new oak trees. He builds nests high in trees of leaves and twigs that may be mistaken for a bird's nest without closer examination.

Reptiles

B1 Broad-headed Skink
Large lizzard, head-and-body length may reach 5 1/2 inches. Tan body and large swollen head. Have been found resting underneath fallen logs on trail.

B2 Eastern Skink
Bright blue tail in the young, and in some adults. The Blue tends to fade with approaching adulthood. The tails are allowed to come off when pulled, still wiggling, to give the appearance of life, and giving the lizzard a chance to escape.

B3 Fence Lizzard
Grayish to brownish lizzard with darker bands in a sideways pattern across the back. One can see the scales overlapping on the body, giving a nearly spiny-like appearance.

B4 Copperhead
This coppery-brownish-red snake may reach a length of 30 inches. It is poisonous, a pit-viper, with the triangular-shaped head. They are even-tempered snakes that need provocation before striking. Of the 308 copperhead snake bites recorded by the Anti-venom Institute of America in a 10 year period, none resulted in deaths, regardless of the treatment given. This should give some comfort should a person be bitten. Pack the wound in ice, if available, and take the victim to medical attention as soon as possible.

B5 Green Snake
Reaches a length of 22 to 32 inches. Generally found climbing small trees and bushes.

Amphibians

C2 Cricket Frogs
Aquatic frogs. They jump into water and then immediately swim to shore, hoping to escape predators.

C2 American Toads
Vary greatly in color, from gray to brown to reddish brown. Adults may reach 4 1/2 inches. Skin is not slimy, but has a nearly rough texture.

Birds

D1 Crow

The "caw, caw, caw" of this bird may ring out, giving an alarm to the others who are feeding nearby. The crow is probably the most intelligent of our native birds. He will eat almost any type of food, but mostly that which can be found on the ground. An experienced bird is usually placed as a sentinel on some high point to give warnings of danger.

D2 Mocking Bird

The state bird of Texas. Body is gray with slightly darker wings. He is most known for his variety of calls, for he is a quick learner of tunes. One authority has noted that one mocking bird imitated the songs of twenty species of birds in a single ten-minute performance. Sings regularly at night.

D3 Yellow-bellied Sapsucker

Can be heard pecking away at the trunks of trees, sometimes looking for the sweet sap of trees. After making the chips fly with his bill as he taps the tree, most often Bois d'arc, he may go to another tree to repeat the process. Later, he will come back to the first tree, suck the sap into his bill, then throw his head back to swallow the sweet nurishment.

Crustaceans

E1 Crayfish

Resemble tiny lobsters and in fact are their relatives. Some species are found only in ponds, others only in streams, and others only in very wet land where they live in burrows with a small pile of mud balls (on top that have been) brought up from the digging. Many kids enjoy going "Crawdad fishing" with bacon suspended from string and even success has been recorded using red licorice.

E2 Pill Bug (Roly Poly) 1/2"

Is not a millipede but a small land crustacean that feeds on humus and fungi. These animals have seven pairs of legs, and can roll up into a tiny ball when disturbed.

Insects

F Insects

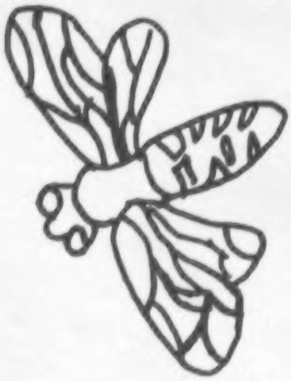
More than half the living organisms on earth are insects. They out number all other animals and plant species combined. Insects have three pairs of legs, one pair of antennae, and many times one or two pairs of wings. They have what is called an exo-skellecton, in which their outer covering serves as strength and support for the body.

F1 Carpenter Ants (1/2")

These social insects live in the dead wood of logs and timbers. Bits of saw dust from their burrowing duties often fall down on plant leaves below. These are amoung the largest ants known.

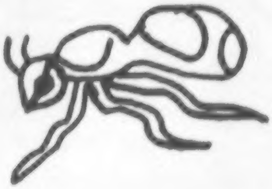
F2 Cicada Killer (1.6")

They are black and yellow. Solitary wasp that digs a burrow with side passages in soft earth to store adult cicadas (locusts) that have been paralyzed by the female cicada killer's sting. As the killer and her prey are too heavy to achieve lift-off from the ground, she must drag the cicada up a tree to get enough altitude to reach the burrow. If the burrow is very far away, she will repeat the climbing and dragging process until she reaches her goal. There she will lay her eggs on the cicada to provide food for her young.



F3 Cow Killer (3/4 to 1")

The females appear ant-like for they have no wings, although the males do. These insects are paracites of bees and wasps. They will intrude into other burrows and lay their own eggs on existing larva which the young of the cow killer will eat when hatched.



F4 Honey Bees (1/2")

The colony consists of one queen bee, female worker bees, and male drones. Worker bees have a barb, very much like the end of a fish hook, at the end of the stinger, that will penetrate the skin of an intruder but cannot be removed. Thus, when the bee pulls or is brushed away, the hind-end remains. Perhaps instinctively these bees realize their own danger and will not attack unless the safety of the hive is at stake, for they litterally give their lives for the cause of protecting their home.

F5 Paper Wasps

These social insects build paper-like nests that resemble a gray honey comb. Eggs are laid in each cell, and when hatched, are fed daily until they form a pupa. Unfertilized eggs develop into males or drones, and queens and female workers develop, depending on what composition food is given to them during early development, from fertilized eggs.

F6 Angel Wings
Have sharp, angular margins on wings, which resemble dead leaves or bark, the edges of the wings appearing frayed or torn. The tones on the folded wings are wood-colored.

F7 Fall Web Worm (3/4")
Web is built that covers the leaves of the tree. Adults are white moths with peppered wings. These catapillars can be very destructive to growth.

F8 Monarch (4")
Best known of all butterflies. Well-known for its migrations. The orange, black, and white striped larva feed on milkweed plants. The blood of these larva and adults are nauseating to birds and so are avoided by them. A butterfly that takes advantage of the monarch's protection is the viceroy butterfly. With completely different habits and lack of protection itself, its wing pattern so closely resembles the monarch's that the birds leave it alone as well.

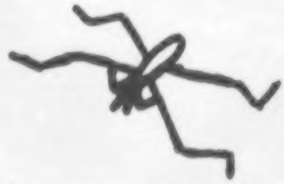
F9 Sphnix Moths
Several varieties have been seen clinging head down on grey-barked trees, such as Red oak. So camouflaged are these moths that a person may walk around a tree two or three times before focusing on them. This coloring is his protection against animals, such as birds, who would like to make a meal of them.

F10 Sulphurs (2")
Among the first butterflies seen in the spring. These are usually yellow with grey borders on wings.

F11 Swallowtails (3 to 5")
So called because of the tail-like projections from the hind wings. Several varieties have been seen at the site, including the tiger, zebra, giant, black, pipe vine, and spice bush swallow tails. The larva of the latter species of swallow tail is a green catapillar with two large black and yellow "eyes." Many birds are frightened away as they believe they have come across a green snake in the trees.

F12 Tent Catapillar (3/4")
Tents are built in the crotch of branches in early spring. Adults are tan moths.

F13 Water Striders (1/2")
Spider-like Insects. Because of surface tension on the water, these insects are able to glide on the surface without breaking through. Forelegs are used to capture prey, middle legs to propel over the water, and back legs to guide itself as a rudder.

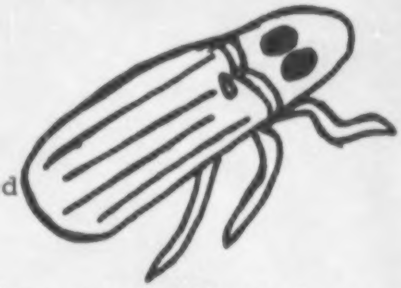


F14 Whirligig Beetles (1/2")
These insects whirl and swim at the surface dive when disturbed. They are small, oval insects that seem to spin in circles on the surface.

F15 Ant Lions (2/3")
The larva of this insect lives underneath the end of a funnel in sandy soil waiting for an ant or other small insect to tumble in. As the sand is rolled down to the tip of the funnel by the trapped insect, the ant lion kicks the dirt out of the funnel, causing the insect to be quickly caught in powerful jaws. The adult ant lion resembles a small dragon fly.

F16 Cicada (1.8")
Mistakenly called,"locust." Steady hum fills air in late summer. Sound is made by the males with the plate-like organ on thorax. Female cuts slits in young twigs to deposit eggs. When young hatch, they will drop to ground, to bury themselves, depending on the specie, from 4 to 20 years. At end of this period they crawl out of the ground to climb up on a low limb, post, etc. to shed skin. Adults live only about a week, long enough to mate and lay eggs.

F17 Click Beetle (1 1/2")
These have a startling black-eyed pattern on back of "head." If it lands on his back, after a moment he will suddenly flip into the air with a loud "click." Thin larva live in the ground or in rotten wood and maybe referred to as wire worms.

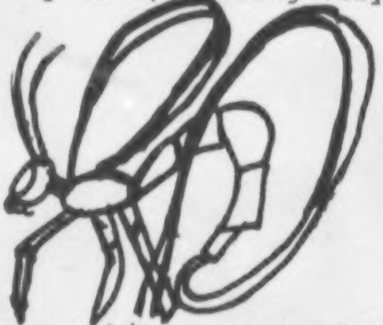


F18 Dragon Flies and Damsel Flies (2")
These insects catch their prey in a "basket" they make with their front legs while folded. Have fairly good eyesight for this purpose. The nymphs of dragon flies have a folding extendable lip that darts out quickly to catch unexpecting passing prey in the nymths underwater environment.

F19 Grasshoppers (1/2 to 2")
These insects can destroy crops if in great abundance. Are eaten by larger birds and small mammals. Eggs are laid in the ground. When hatched, the young will crawl out and go through a series of moltings before reaching adulthood.

F20 Green June Beetles (1")
The larvas of these beetles have the strange habit of moving by the brislles found on their backs, rather than moving by their short legs. The adults are common during the day time, buzzing very much like bumble bees.

F21 Ichneumon Flies (1 1/2")
Help control harmful insects, as their larva are paracites to larva of flies and other pests. The long hoop-like "stinger" is used by the female to pierce several inches of wood to deposit eggs.



F22 June Beetles (1") (May Beetles)
White eggs laid among roots hatch into large white grubs, which may feed for 2 or 3 years. The pupae stage occurs underground and the adults dig their way to the surface. These insects are seen often in the evenings around homes when attracted to outdoor lights.

F23 Ladybird Beetles (1/3")
Both the larvae and the adult of this insect feed on aphids, small creatures that can do considerable damage to orchards. The adults hibernate during the cold weather under rocks and fallen logs.

F24 Mosquitoes (1/3")
Eggs are laid in rafts on the surface of still water which hatch into wiggling larvae, They later become large "headed" pupae and emerge at the surface of the water as adults. Males beaks are not suited for piercing, although females can bite and therefore transfer disease. Control of these pests are aided by draining s swamps and the use of insecticides.

F25 Praying Mantis (2 1/2")
These insects were introduced to the U.S. more than 50 years ago. If confined, these insects may turn canable. They catch their pray by remaining very still while the victim comes within reach. The front two "praying" legs shoot out to grasp the meal. The female will lay several hundred eggs in a frothy mass that dries very hard. The egg case resembles a brown "Pill Bug" and may be 1" in length.

F26 Spittle Bugs (1/3")
Females produce a bubbly froth on grass stems with excess plant juices to hide and protect eggs. Young green nymphs are also capable of making the froth by themselves while feeding. Brown adults seldom fly, but hop from plant to plant.

F27 Stink Bugs (1/2")
Have a flat, shield-shaped body and suck plant juices. Are colored green, brown or gray. Release a bad odor from two glands or the thorax, theat does not particulary seem to bother the birds that feed on them. These insects do fly, although seemingly for short distances. Spend much time clinging to tree bark.

F28 Wood Borers (1")
Larva of flathead borer feed mostly underneath the bark, giving a worm-trail appearance, longhorned borers channel far into the trunk, sometimes producing a pile of saw dust on the ground next to the log.

Spiders/Scorpions

G **Spiders**

Webs are built mostly at night. Watch out if you are the first one on the trail in the morning. You can feel the thin, silken threads across arms.

G1 **Sheet-web Weavers** (.2")

Usually have a pattern on the abdomen. Webs are found in abundance in high grass or bushes. Sticky threads cause an unwary insect to become entangled. The spider bites from below, and pulls the insect through the sheet of the web to be wrapped up.

G2 **Funnel Weavers** (Example: Grass Spider) (.6")

The spider hides in the narrow end of a funnel of the web that spreads out across the grass, and lies in wait for an insect to attempt to cross the web. On feeling the vibrations the spider runs out to bite the victim and carry it back to its funnel. These spiders may be coaxed to investigate a blade of grass vibrating the web or a tiny insect tossed onto the web surface.

G3 **Orb-web Spiders** (1 to 2")

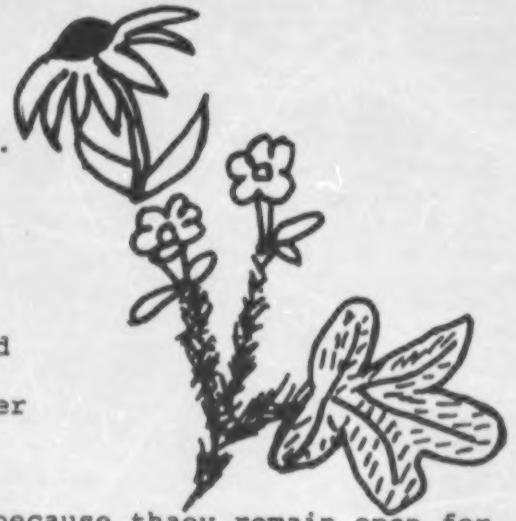
These include the Black and Yellow Argiope which hangs upside down in a large web with a conspicuous zig-zag in center of web commonly called garden spider. Web may be 2 feet in diameter. The top edge thread of a web is formed first, the spider allowing the gentle breezes to carry it to a nearby branch. Other spokes are then formed and then beginning at center, the spider spirals out to the edge of web.

G4 **Scorpions** (2")

These are not insects, as they have 4 pairs of legs and 1 pair of pinchers. Scorpins that burrow hold their trails up, while those that live under stones or bark carry their tails to one side. Scorpions are good reasons not to kick over logs.

Flowering Plants

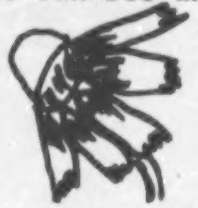
H1 **Black-eyed Susan**
Yellow petals and dark brown center.



H2 **Bull Nettle**
The stems and even the leaves are covered with stiff stinging hairs that may break off in the skin and be difficult to remove. The plant may have several beautiful 5-petaled flowers that may deceive one into thinking this is a plant of a gentler kind.

H3 **Day Flower**
These pansy-like flowers are named because thaey remain open for a single morning. At first there seem to be only two conspicuous blue petals, but on closer examination one can see an inconspicuous white petal to make up a trio.

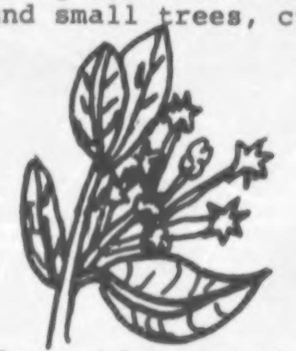
H4 **Firewheel**
Brown center with red petals tipped with yellow.



H5 **Ironweed**
Dark purplish flower found at the entrance of the trail. A member of the daisy family. The seeds have parachute-like hairs that may carry them relatively great distances.

H6 **Japanese Honeysuckle**
This plant was introduced to this country from Eastern Asia to be an oriental plant of fences and lawns. It has escaped to the woodlands where it is in danger of strangling the native vegetation. The vine-like plant wraps so tightly around small trees, cutting off their sap flow.

H7 **Milk Weed**
Named for the milky substance that exudes from leaves and stems. The flowers are most often greenish-white and give way to flat seeds with-feather-like plumes. The seed pods resemble boats.



H8 **Poison Ivy/Poison Oak**
Everyone should learn to recognize this plant which can either grow low to the ground or can grow a vine to climb a tree. A very large poison ivy vine is seen on Trail 1 at the roped off fallen log station where the 1st rope was secured. People have been known to lose their immunity, so those people who are immune should not "demonstrate" to those who are allergic. This loss occurs when a person's body chemistry changes.

H9 Pokeweed

White flowers top green folliage that begin to develop red berries even while some flowers are still present on the plant. Said to have poisonous roots.

H10 Stinging Nettle

Green plant from 4" to 2 1/2 feet with stinging hairs on stems and leaves. Like bull nettle, these hairs can sting, and cause skin to redden and blister if touched by arm or leg. Each hair is a razor sharp point that breaks off in the skin to release formic acid as in ant bites.

H11 Sunflower

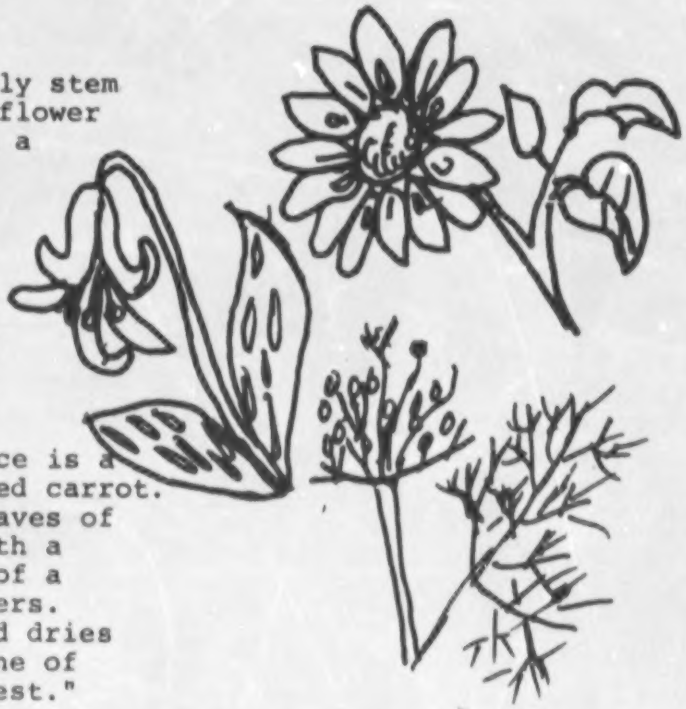
Medium to tall plant, stickly stem and yellow flowers. State flower of Kansas. Their seeds are a valuable food for birds.

H12 Trout Lily

Leaves have the speckled markings of a trout. Also known as "fawn lily" as the markings also resemble a fawn's coloring.

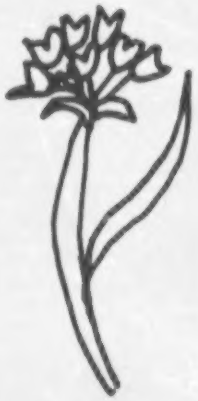
H13 Wild Carrot

Also called Queen Anne's Lace is a wild varity of the cultivated carrot. The leaves appear as the leaves of a carrot from the store, with a white flower head composed of a glomeration of smaller flowers. In the fall, the flower head dries and has the appearance of one of its common names: "Birds Nest."



H14 Wild Onion

Pink or white flowers on top of onion-like stem and leaves. If these leaves are crushed, will smell like onion. When these plants become plentiful in dairy pastures, the milk produced may have a slight onion or garlic flavor.



Non-Flowering Plants

I1 **Bracket Fungi**
Brown shelf-like projection found on sides of trees and fallen log. Does not produce its own food by photosynthesis but must secure nurishment from other plant material. Also referred to as "shelf fungus."

I2 **Lichens**
Found on rocks, trunks of trees. Actually, lichens are two kinds of plants living together, fungus and algae, for mutual benefit. The fungus supplies the algae with water and minerals, and in turn the algae manufactures food for the fungus, which can not produce food by photosynthesis.

I3 **Jelly Fungus**
Brown fungus found on trunks of trees that is rigid when dry, but jelly-like when wet. May resemble human ears when it occurs as brown folds, thus the name, "Ear Fungus."

I4 **Moss**
Green growth that may grow on soil, rocks, or bark of trees. This plant often has a furry appearance. Mosses grow from spores that are produced in tiny capsules. Look for it on the north side of trees, out of direct sunlight.

I5 **Mushrooms**
May be seen in the damp earth just after a rain. These fungi have an umbrella-like cap that shelters the spore-laden gills underneath. No mushroom is safe to eat unless identified by an expert!

Nuts/Berries/Galls/Vines

J1 Acorns

There are many oak trees here on the site. Many are Red Oaks, several are Bur Oaks. The Bur Oaks have the largest acorns of any in the oak family, some reaching 2" across.

J2 Wild Grape

There are many wild grape vines at the site. Their woody, thick brown vines are often seen hanging in and over the trail. Purple grapes are found in the late summer. Empty skins of the berries are found on the ground where birds and insects have already feasted on the fruit.

J3 Green Insect Galls

Green knots on leaves are caused by insects who built a house in plant tissues. These galls are caused by irritation to the plant by the insect. A certain species of insect chooses a particular species of plant to make these homes in.

J4 Pecan

There are many pecan trees on the site, that provide nuts for many animals such as squirrels. Green hulls cover the pecan shells until they ripen, turn brown, open, and allow the nuts to fall. Sometimes the hulls covering the nuts fall to the ground still green.

J5 Plums

There are several Mexican Plum trees on the site which have small green to reddish plums that may fall to the ground before becoming ripe. Many animals are attracted to the fruits.

J6 Oak Apple Gall

Crusty hollow brown cavities filled with a star of fluf. A small larva may be found inside, which has secreted a substance which causes the plant tissues to expand.

J7 Walnut

Brown hulls cover the shell of the walnut, and these may be mistaken for a large brown gall.

J8 Greenbriar (Cat briar)

Green-to-brown vines that have thorns that resemble cat claws. The vines support themselves by using tendrils to wrap around twigs and branches of nearby trees to raise themselves up off the ground.

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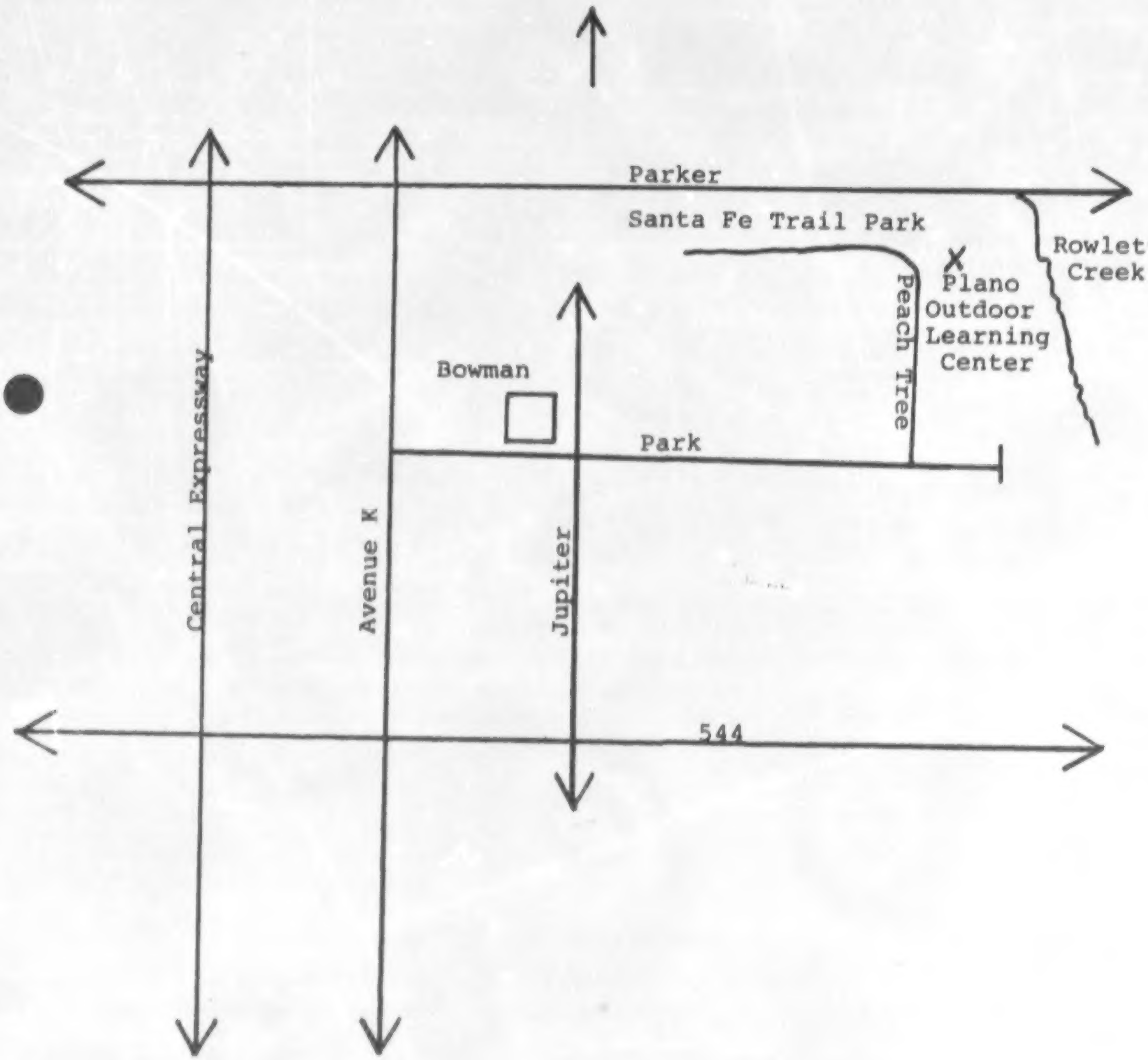
To reach Plano Outdoor Learning Center

Go east on Park. Turn left (north) on Peach Tree. Where the road bends, park your car. This is just past a "no dumping" sign. Walk across a field (Rice School Site). On the east side of the field, there is a sign:

Outdoor Learning Center
Foot Traffic Only
Plano I.S.D. City of Plano

Enter here.


Parker
Santa Fe Trail Park
Rowlett Creek
Plano Outdoor Learning Center
Peach Tree
Bowman
Park
Central Expressway
Avenue K
Jupiter
544